SD 431.5
A2522

# TIMBER MANAGEMENT PLAN

SAN ISABEL NATIONAL FOREST

General Statement
and
Working Circle Plan

July 1, 1962 - June 30, 1972

Colorado - Region 2

REGION TWO

## FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

# SAN ISABEL NATIONAL FOREST

General Statement
and
Working Circle Plan

July 1, 1962 - June 30, 1972

Colorado - Region 2

Property of
U. S. Forest Service
Rocky Mountain Forest and Range
Experiment Station

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Plans

2410

# GENERAL TIMBER MANAGEMENT STATEMENT

## U. S. DEPARTMENT OF AGRICULTURE

## SAN ISABEL NATIONAL FOREST - REGION 2

## COLORADO

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| Region or Station | | | Washington Office | |
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| Initials | Date | | Initials | Date |
| CCA | 1/20/60 | Timber Management | HJH | 3/29/60 |
| BKC | 9/22/59 | Range Management | RSR | 3/18/60 |
| MFB | 1/2/60 | Wildlife Management | DMG | 3/22/60 |
| RWG | 1/14/60 | Recreation and Lands | JS | 3/16/60 |
| MMW | 1/15/60 | Watershed Management | GRS | 3/16/60 |
| ML | 1/18/60 | Engineering | CTS | 3/14/60 |
| STM | 1/20/60 | Fire Control | MSS | 3/11/60 |
| GLH | 2/24/60 | Research | | |
| | | Pest Control | WVB | 3/24/60 |
| | | F.M.R. | CEO | 3/23/60 |

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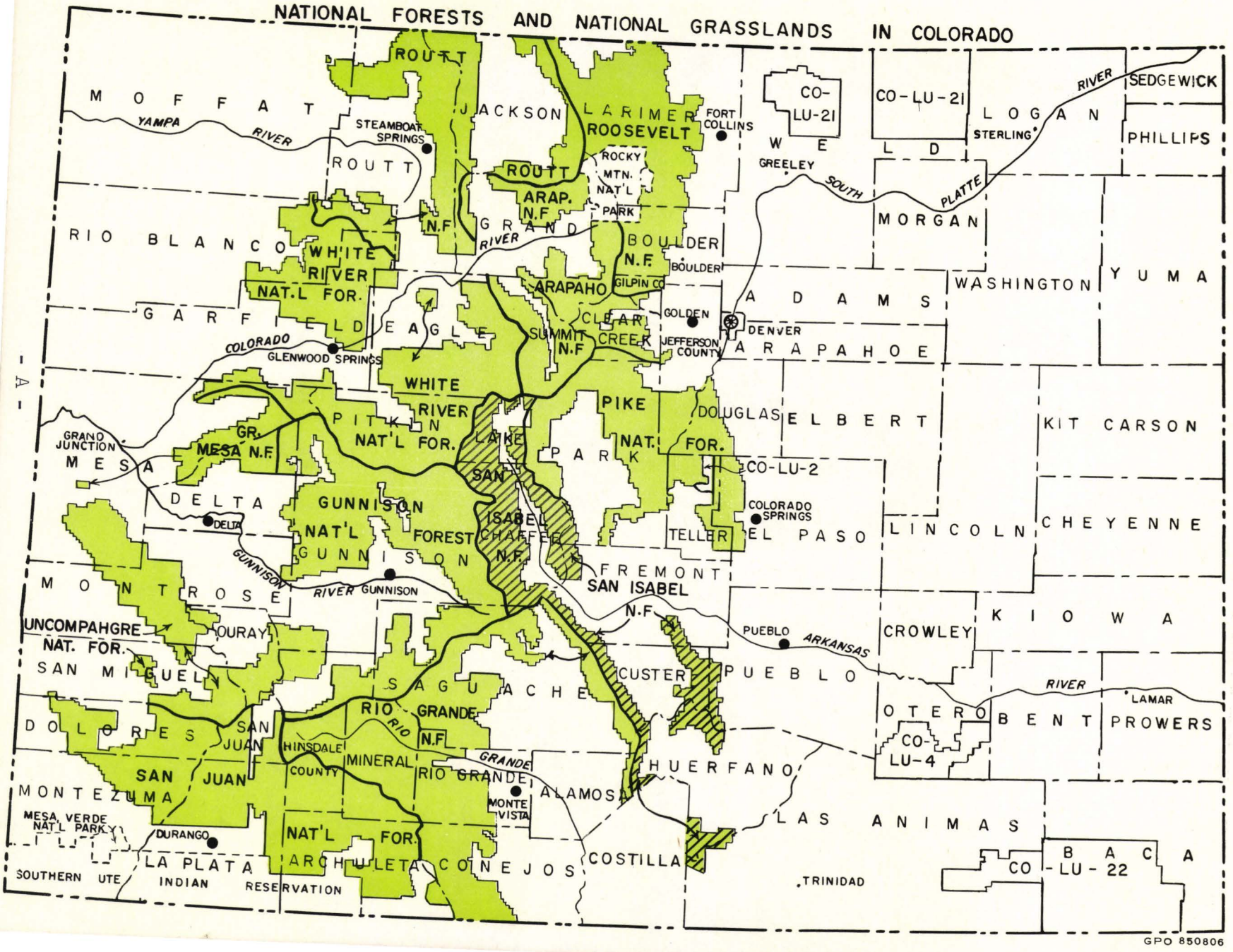

NATIONAL FORESTS AND NATIONAL GRASSLANDS IN COLORADO
ROUTT
MOFFAT
YAMPA RIVER
STEAMBOAT SPRINGS
JACKSON
LARIMER
ROOSEVELT
FORT COLLINS
CO-LU-21
CO-LU-21
LOGAN
SEDGEWICK
PHILLIPS
STERLING
RIVER
WELD
GREELEY
SOUTH PLATTE
ROCKY MTN. NAT'L PARK
ROUTT N.F.
ARAP. N.F.
GRAND RIVER
MORGAN
RIO BLANCO
WHITE RIVER NAT.L FOR.
BOULDER N.F.
BOULDER
GILPIN CO
ARAPAHO
WASHINGTON
YUMA
ADAMS
GARFIELD
EAGLE
GOLDEN
CLEAR CREEK
SUMMIT N.F.
JEFFERSON COUNTY
DENVER
ARAPAHOE
COLORADO
GLENWOOD SPRINGS
WHITE RIVER
PITKIN
NAT'L FOR.
PIKE
NAT. FOR.
DOUGLAS
ELBERT
KIT CARSON
GRAND JUNCTION
MESA
GR. MESA N.F.
LAKE
PARK
CO-LU-2
SAN
DELTA
GUNNISON NAT'L FOREST
ISABEL
CHAFFEE N.F.
COLORADO SPRINGS
TELLER
EL PASO
LINCOLN
CHEYENNE
GUNNISON
GUNNISON RIVER
FREMONT
SAN ISABEL N.F.
MONTROSE
UNCOMPAHGRE NAT. FOR.
OURAY
PUEBLO
ARKANSAS
CROWLEY
KIOWA
SAN MIGUEL
CUSTER
PUEBLO
SAGUACHE
RIO GRANDE N.F.
RIO GRANDE
LAMAR
OTERO
BENT
PROWERS
DOLORES
SAN JUAN
HINSDALE COUNTY
MINERAL
RIO GRANDE
CO-LU-4
HUERFANO
SAN JUAN
MONTEZUMA
ALAMOSA
MONTE VISTA
MESA VERDE NAT'L PARK
DURANGO
LAS ANIMAS
NAT'L FOR.
LA PLATA
ARCHULETA
CONEJOS
COSTILLA
TRINIDAD
BACA
CO-LU-22
SOUTHERN UTE INDIAN RESERVATION
SAN ISABEL NATIONAL FOREST and WORKING CIRCLE
GPO 850806

## INTRODUCTION

The Timber Management Plan for the San Isabel National Forest will consist of two parts, namely, the General Timber Management Statement and the Working Circle Plan.

The General Timber Management Statement contains information to guide the planner in making the Working Circle Plan, and the administrator in its application. The statement includes descriptions, history, guides for multiple-use coordination, and long-range timber management objectives. Frequent revision will not be necessary.

The Working Circle Plan contains short-term (10-year) objectives and programs, including cutting budgets, access road needs, calculation of allowable cut, reforestation and stand improvement programs, etc. It is the action plan and, as such, will be revised as often as necessary to meet changing conditions, and at least each ten years.

## LAND DESCRIPTION

### Location and Subdivisions

The San Isabel National Forest is on the Eastern Slope in south-central Colorado, (see map, page A), within the Arkansas River drainage. With the exception of a small area on the Pike National Forest north of Canon City, all the national forest land in the Arkansas River drainage is within the San Isabel Forest.

In general, the north half of the forest is bounded on the west by the Continental Divide and the south half by the crest of the Sangre de Cristo range. The southern limits of the forest are the Sangre de Cristo and Maxwell Land Grants in Colorado. The northern boundary is the Arapaho National Forest.

There are no block subdivisions. The forest is, however, divided into 44 compartments on the basis, generally, of drainage. The average gross area of compartments is about 28,100 acres.

Table #1

Area By Ownership

Thousand Acres

| National Forest | | | | | State, | | |
|---|---|---|---|---|---|---|---|
| Commercial Forest Land | Non-commercial Forest Land | Non-forest Land | Reserved | Total | County etc. | Private | Grand Total |
| 600 | 179 | 310 | 0 | 1,089 | 15 | 120 | 1,224 |

### Relation to Other Working Circles

A recently constructed access road over Cottonwood Pass links this working circle with the Taylor Park area in the Gunnison Working Circle. Material from Taylor Park will be hauled east to the railroad, probably to Buena Vista. Lumber from small sawmills on the Gunnison is now trucked over Monarch Pass to a planing mill at Poncha Junction. Logs from near Poncha Pass on the Rio Grande are transported to a sawmill at Salida. On the north end, timber could be hauled to or from the Arapaho Working Circle or to pulpwood plants on the Colorado River.

FOREST DESCRIPTION:

Area of Commercial Forest Land by Timber Types

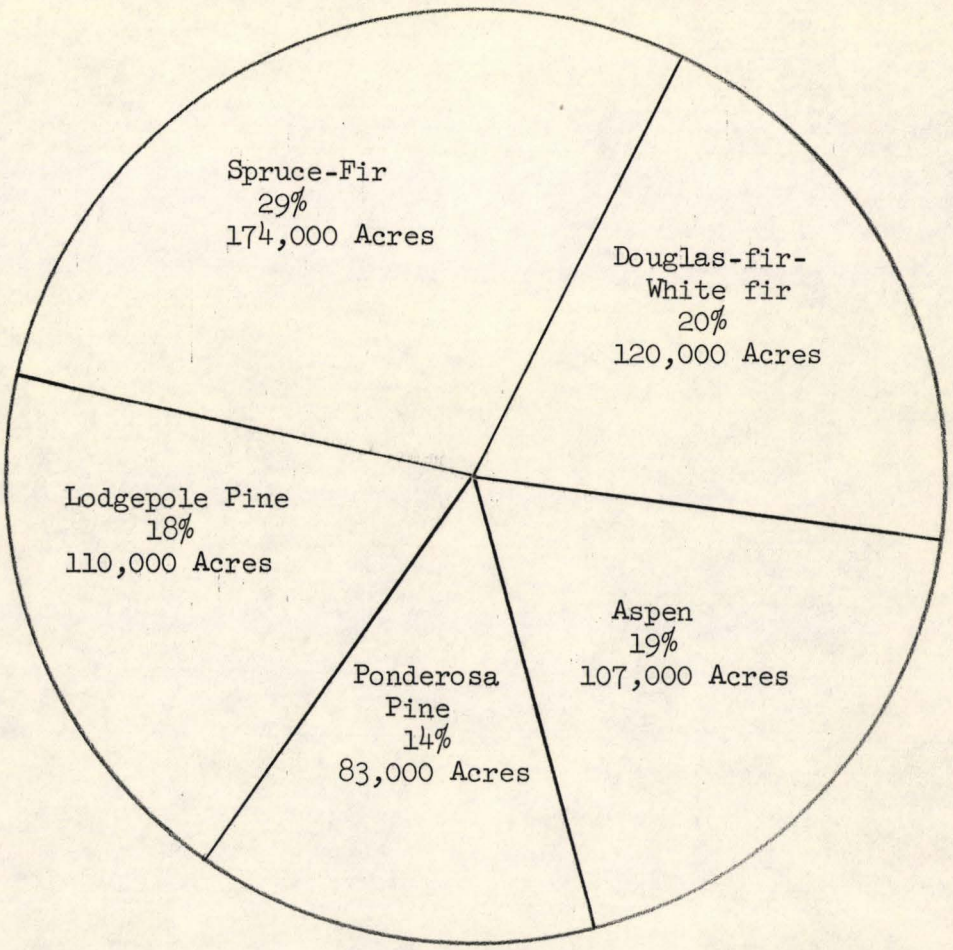



Figure 2

Total national forest commercial forest land, 600,000 acres.

Area by Stand Size

The national forest commercial forest lands are classified as follows:

| | |
|---|---|
| Sawtimber | 271,000 Acres |
| Poletimber | 279,000 " |
| Seedling-Sapling | 40,000 " |
| Non-stocked | 10,000 " |
| Total | 600,000 Acres |

Volume Estimate

The Timber Resource Review gives the following estimate of timber available on national forest commercial forest lands as of January 1, 1953.

| | MMBF |
|---|---|
| Douglas-fir | 71 |
| Ponderosa Pine | 105 |
| True Firs | 82 |
| Engelmann and Other Spruce | 351 |
| Lodgepole Pine | 39 |
| Other Conifers | 4 |
| Total | 652 |

## STAND CONDITION

### General

A general description of the timber on the forest is given by commercial types below:

(1) Spruce-Fir Type

This is the predominant type on that portion of the San Isabel Forest along the Continental Divide, the Sangre de Cristo Range and Spanish Peaks. A large portion of the Engelmann spruce stands were burned over in the early days. The existing merchantable stands within the Engelmann spruce type are usually found in pockets and on benches at the higher elevations. Most of these stands were difficult to log and thus were not cut by the early-day logger. Present road construction methods and the need for continued supply of merchantable timber have brought these stands into an operable classification. Logging costs, particularly those for road building, are relatively high. Volumes in excess of 20,000 feet to the acre sometimes occur. Most of the cutting during the next 20 years will undoubtedly be confined to this type. Second-growth stands on early logging chances and old burns show good growth.

(2) Douglas-Fir Type

This type is generally at the same elevation as the ponderosa pine type. It is, however, confined to the north slopes where there is more moisture. For the most part, the present Douglas-fir stands are of pole size.

(3) Ponderosa Pine Type

This type usually occupies south and east exposures at elevations of 9,500 or lower. At this elevation the accessible stands were attractive to early-day timber operators, hence few patches of mature ponderosa remain. These are usually in isolated areas difficult of access.

Improvement cuttings will be made within the next 20 years in second-growth ponderosa pine where growth data indicates such action to be practicable.

(4) Lodgepole Pine Type

The San Isabel National Forest is near the southern limits of the range of this timber type. In the Spanish Peaks area, at

the south end of the forest, the tree seldom attains sawtimber size. It is used here principally for mine props and posts. At the north end of the forest, in the Leadville area, sawtimber stands originally occurred but were burned or cut-over 70 to 80 years ago. Uncontrolled fires destroyed most of the original lodgepole pine stands. Utilization of the remaining timber was for charcoal, railroad ties, lumber and mine props. The present second-growth stands are used for poles and posts. Remnants of the original sawtimber stands occur only as small, isolated patches unimportant for lumber production. The second-growth stands could, however, produce a substantial volume of pulpwood if the market were available.

Dwarfmistletoe has not been a problem in the lodgepole pine stands on this forest.

(5) White Fir Type

White fir usually occurs intermixed with ponderosa pine and Douglas-fir, particularly along the east side of the Wet Mountains and in the Sangre de Cristo Range from Westcliffe south to the Huerfano River drainage. Large, pure stands of this species are not common. The principal product is Christmas trees and stands can be managed for this purpose because of the rapid growth qualities and suitability of the species.

(6) Aspen

Large areas of aspen occur northeast of Salida and along the Sangre de Cristo Range south and west of Westcliffe. Other sizeable aspen areas are west of the Spanish Peaks and southeast of Greenhorn Mountain. This type occurs on areas formerly of coniferous cover but which were burned over in the early days. The stands are of little commercial value for forest products but they have a high value for watershed protection and aesthetics. These scenic values are particularly high in the Spanish Peaks area.

PREVALENCE OF INSECTS AND DISEASE

The forest has in endemic proportions a population of the Black Hills bark beetle in ponderosa and lodgepole pine and the Engelmann spruce bark beetle in Engelmann spruce. No severe outbreaks have occurred from these insects. The Great Basin Tent Caterpillar has been in epidemic proportions for the last ten years and has caused considerable damage to aspen stands. This infestation has recently subsided. Most of the ponderosa pine type is infected with dwarfmistletoe.

## SUMMARY OF RESULTS UNDER PREVIOUS PLANS

The allowable cut was not approached under previous plans since:

(1) The forest development road system was inadequate, even for relatively accessible timber stands.

(2) Much of the timber was, and still is, in areas difficult of access. Road costs to reach timber stands in many drainages are excessive for the volumes available. Harvesting such stands must await opportunity for multi-purpose financing as recreation and other use increases.

(3) The local timber industry has been inadequate and unstable.

The recently constructed Cottonwood Pass road may give impetus to the timber industry. A mill established on the Arkansas River principally to process Gunnison National Forest timber could also utilize an appreciable amount of San Isabel National Forest timber.

Table #2

PREVIOUS PLANS

| Working Circle | Date of Approval | Area Comm. Forest Land (M Acres) | Total Volume (MMBF) | Annual Allowable Cut (MBF) |
|---|---|---|---|---|
| Arkansas River | 5/28/28 | 305 | 107 | 2,500 |
| Huerfano | 9/11/36 | 46 | 94 | 1,000 |
| Poncha | 10/1/27 | 38 | 97 | 2,000 |
| Westcliffe | 12/20/32 | 61 | 109 | 3,250 |
| Spanish Peaks | Not Approved | 7 | 52 | 830 |
| Forest Total | | 457 | 459 | 9,580 |

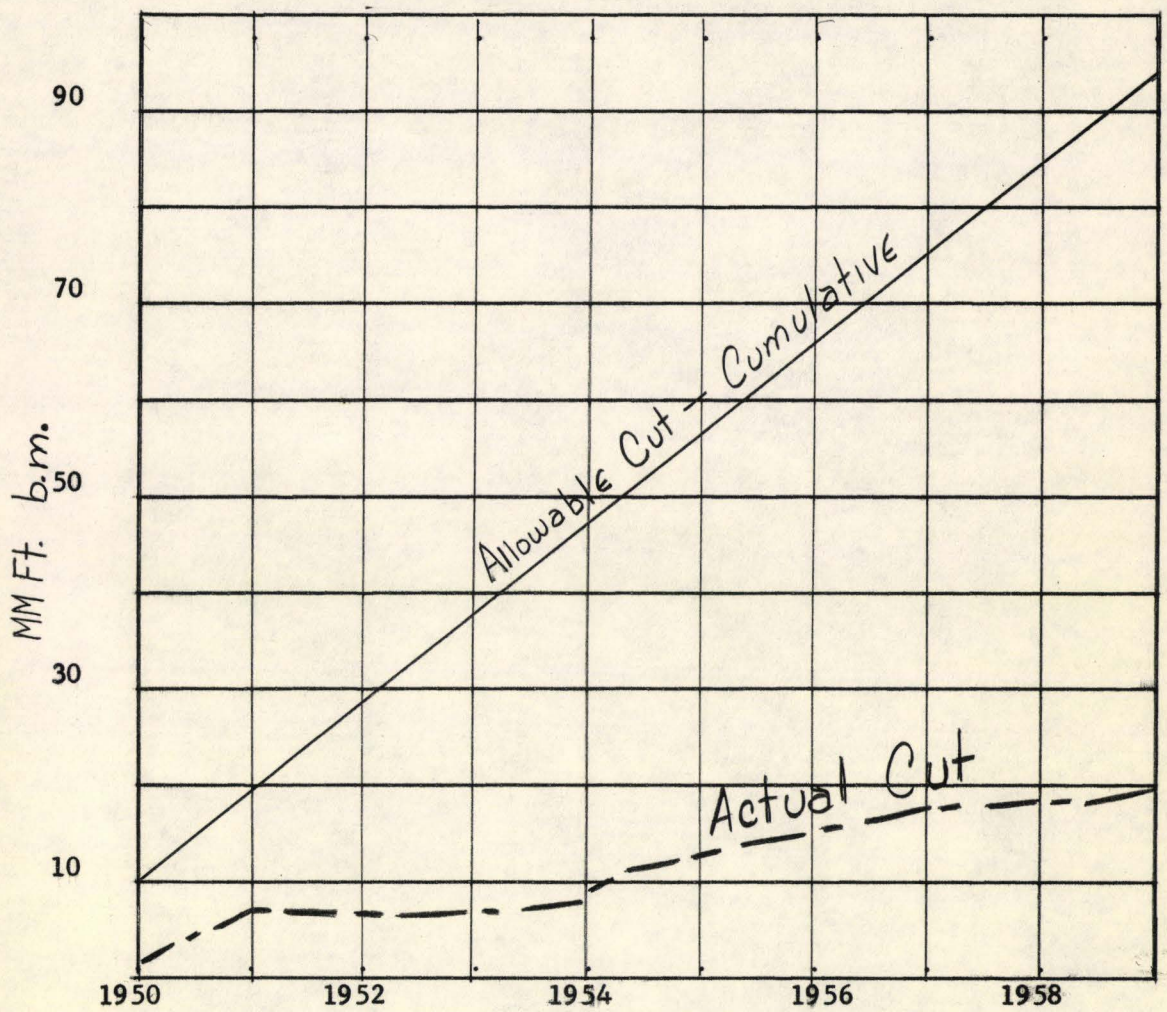
Actual Cut

| | |
|---|---|
| FY 1935 - 1939 | 7,223 MBF |
| FY 1940 - 1944 | 7,428 MBF |
| FY 1945 - 1949 | 16,693 MBF |
| FY 1950 - 1954 | 9,856 MBF |
| FY 1955 - 1959 | 9,727 MBF |
| Total . . . . . | 50,927 MBF |

The average annual cut for the 25-year period shown has been 2,037 MBF. Records for the period 1915 to 1934 are complicated by changes between fiscal and calendar year but indicate an average annual cut of about 1,086 MBF.

**FIGURE #3**

**COMPARISON OF ACTUAL CUT WITH ALLOWABLE CUT**



## SILVICULTURAL SYSTEM:

### Past:

Previous management plans called for selective cutting in most types under most conditions. Where it was properly applied in ponderosa pine stands, there is now a healthy, managed stand that will soon be ready for a second cut. In lodgepole pine and Engelmann spruce stands, selective cutting has, however, resulted in a stand of poor quality with low volume and low production.

### Current

*The present policy is based on the Rocky Mountain Region Timber Management Guides which normally provide for a clear-cut system for all species with even-aged management as the objective. The guides are flexible enough to meet individual situations.

## MANAGEMENT OBJECTIVES

The ultimate objective of management is to improve timber quality and growing conditions so as to produce timber to the sustained yield capacity of the working circle.

An average annual growth rate of 100 to 150 ft. b.m. per acre can be expected under good silviculture. Using the lower figure, and the commercial forest area of 427,000 acres, a total annual growth of about 42.5 MMBF is indicated. This long-range growth objective can be attained only by putting all overmature, diseased, and over or understocked stands into good growing condition.

The working circle plan will include short-term, (10-year), programs designed so that the long-range growth objective may be reached by the year 2000. As a basis for these programs, the allowable cut will be reviewed and recalculated at least every 10 years. Also, the following will be used as guides in the preparation of the 10-year programs:

(1) Complete the harvest of overmature sawtimber stands in the next 40 years. The length of this liquidation period may be adjusted as better information is obtained on volumes, losses, and economics.

(2) Develop a desirable distribution of age classes.

*Note: Revised in accordance with the W.O. comments of March 29, 1960.

(3) Improve stand sanitation through cutting. Give particular attention to reducing infections of dwarfmistletoe in ponderosa pine stands.

(4) Restrict insect infestations to within the current endemic level.

(5) Keep fire damage within the "PAR" objective.

(6) Initiate a reforestation program that will:

a. Assure, through fill-in planting, adequate stocking on cut-over areas within 5 years after cutting.

b. Bring poorly stocked ponderosa pine stands to adequate stocking through fill-in planting.

c. Reforest some 14,000 acres of poorly or non-stocked commercial forest lands such as old burns.

(7) Maintain good stocking in all timber stands by commercial and non-commercial thinning.

In order to accomplish the above, action will be taken to:

A. Establish a local forest industry to utilize the allowable cut of sawtimber. This will mean encouraging improved manufacturing standards and increasing plant capacity by at least three times. Timber sale promotions will be stepped up to accomplish this by 1965.

B. Establish a forest industry that will utilize small, round material from trees less than 10.0 inches, d.b.h. Such an industry would make possible much-needed commercial thinnings. A post and pole operation supplying products to eastern Colorado and Kansas markets would be of benefit. A pulp mill on the Colorado River could utilize material from the north end of the forest, principally from the Leadville District. The San Isabel Working Circle could support a small, groundwood pulp plant (about 150 ton capacity) on the Arkansas River. Establishment of an industry to use an appreciable volume of small material will be accomplished by 1970.

C. Insure that a good timber management job is done. The increasing public use of the forest dictates the maintenance of aesthetic and recreation values in all timber activities. Watershed and soil values likewise must be protected in accordance with the provisions of the land management plan. These objectives can be reached by doing a good job of timber management.

A continuing public relations program for educating the people in silvicultural and timber harvesting practices will be included in the forest's I&E plans.

D. Provide adequate training of all forest employees as a high priority activity. A continuous training program is needed to keep employees abreast of research findings and of changing conditions in the timber management field. On-the-job training, self-training through review of publications and other correspondence, group-training, close association between trainee and trainer, work details, and other methods will be used to accomplish the training job to a high professional standard.

## TRANSPORTATION

A good railroad and highway system is available for transportation of products to eastern markets. Figure 4 on page 12 shows the fine basic network of roads and railroads that services the forest. The main problem is the trucking of logs or lumber from the forest down to this network.

The forest development road system is at present inadequate. Access roads will be planned so that they will provide a good transportation system for the forest. Layout of these roads will be done by a forest engineer in conjunction with the timber management officer in order to obtain locations which will serve both present and future cuts, and, if practicable, more than one timber unit. In most instances, these roads will be needed for other forest uses and thus should be constructed by use of multi-purpose funds when possible.

Table #3

Summary of the San Isabel National Forest Development Transportation Plan as of June 30, 1959

| Primary Forest Value | Existing | Additional Need | Total |
|---|---|---|---|
| Timber | 335.6 | 1,812.9 | 2,148.5 |
| Administration and Fire | 163.2 | 724.2 | 887.4 |
| Other Resources | 229.5 | 82.0 | 311.5 |
| Total | 728.3 | 2,619.1 | 3,347.4 |

## HIGHWAY AND RAILROAD NETWORK SERVICING

San Isabel National Forest

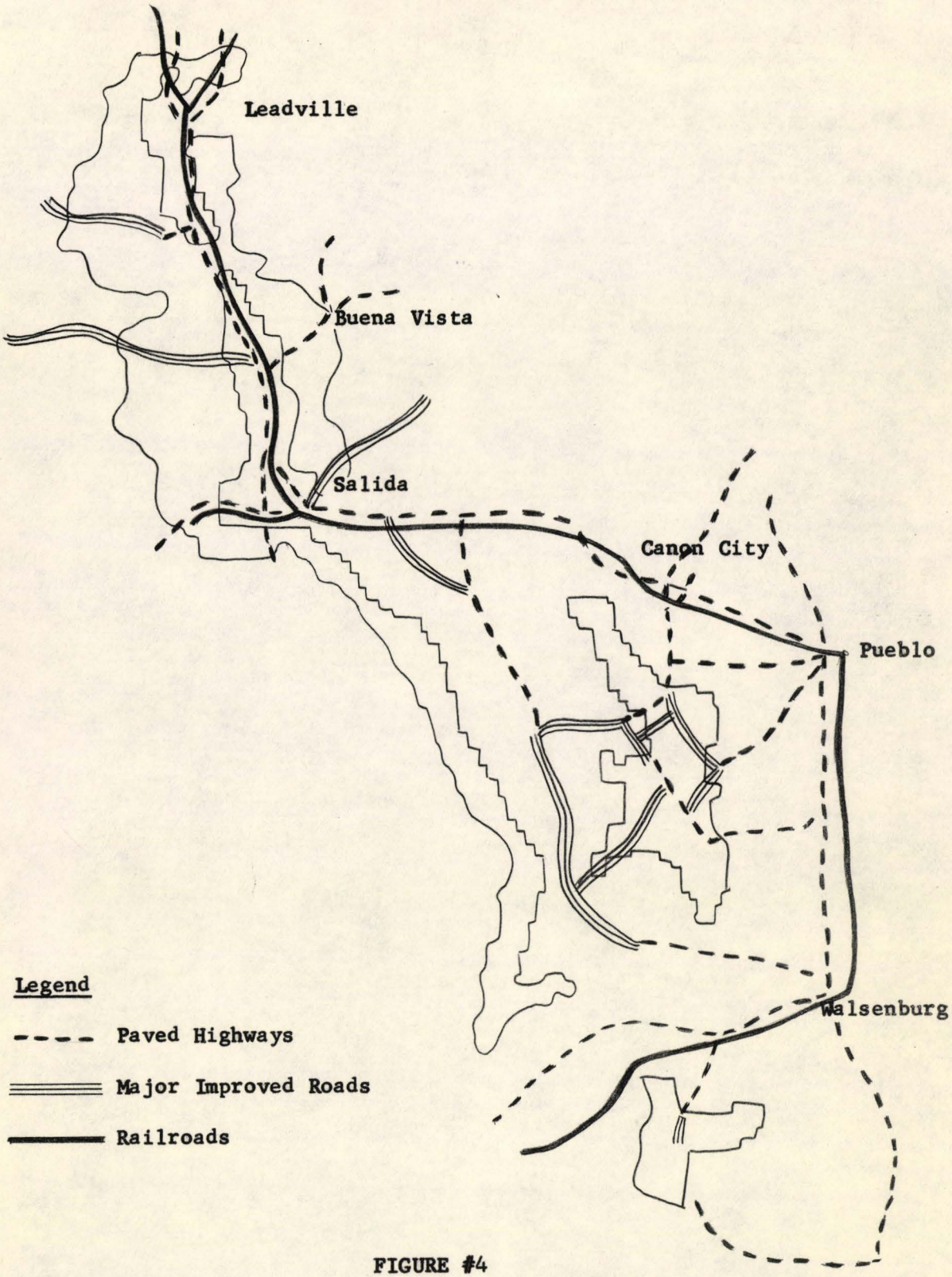



FIGURE #4

## REFORESTATION

Approximately 7,900 acres have been planted on the forest since 1905. Ponderosa pine, lodgepole pine, Douglas-fir and pinon have been the main species planted. Most of the plantings can be considered failures. The poor record of survival is due in part to the poor sites on which the plantations were located.

Approximately 1,295 acres were direct-seeded during the period 1905 through 1915. All seedings were failures. No direct seeding has been done recently, although present plans call for a few small administrative studies to determine the feasibility of several new seeding methods and seed treatments.

Information as to the total area in need of reforestation will be obtained starting in 1959.

## TIMBER STAND IMPROVEMENT

With the exception of some pruning in ponderosa pine done in connection with watershed improvement work by the CCC's in the late 1930's the TSI work on the San Isabel has been limited to small K-V thinnings done on timber sale areas.

An estimated 50,000 acres of immature timber is in need of thinning. Most of this work will be in lodgepole pine stands on the north end of the forest and in ponderosa pine on the south end.

## PROTECTION

(1) Disease

There has been no disease control on the forest to date except under the standard disease clauses in timber sale contracts.

Dwarfmistletoe is causing considerable damage to ponderosa pine. All cutting and TSI work in ponderosa pine will be directed toward the control of dwarfmistletoe.

(2) Insects

There are no indications of any past severe insect attacks on the forest. The Black Hills beetle is always present and occasionally an attack will reach epidemic proportions. Minor control jobs and timber sales have kept this insect within bounds.

The Great Basin Tent Caterpillar has been epidemic in aspen stands

on the forest for the last 10 years in Huerfano and Las Animas Counties. Limited areas along Cucharas Creek were sprayed by plane in 1955, 1957 and 1958 in cooperation with Huerfano County and the State of Colorado. This spraying was done to protect the scenic, recreational and watershed values rather than the timber values. A check made in late June 1959 shows almost no defoliation in the area. This might mean the end of this serious local attack.

The presence of the spruce bark beetle has been noticeable throughout the spruce type but has never become epidemic. The trees killed from this cause were confined to individuals or small groups. No control work has been undertaken.

(3) Animals

The only animal that has caused any considerable damage to the timber resource in the past has been the porcupine. Control work done by forest officers, loggers, ranchers and hunters has kept the porcupine population in reasonable check. Greater control efforts will be needed, particularly in future ponderosa pine plantations.

The numbers of domestic livestock using the forest have been reduced in general to the carrying capacity of the range. Because of this, the damage to reproduction by trampling and grazing is very minor.

Mice and other small rodents have not noticeably been a problem as yet except in plantations.

(4) Fire

Since the area has been put under National Forest administration, fire occurrence has been relatively low. 957 fires have burned 6,993 acres since 1909. No records exist prior to then. From the looks on the ground, and from discussions with early settlers in this part of the State, fires burned extensive areas of the forest in the 1800's. No control was used during this early period. Although 20% of the fires since the forest's inception have occurred since 1950, only 10% of the burned-over area has occurred during this period. This would seem to indicate that our prevention efforts haven't kept pace with our suppression efforts.

The largest fire since the Forest Service assumed administration occurred in 1939 near Granite. 1320 acres of timber burned in this fire. Since 1939, only two fires have burned more than 100 acres.

(5) Weather

The only weather factor that might be considered is wind. The winds are generally westerly. The broken character of the terrain holds velocities down so that they are generally not of a serious nature.

## LAND PROBLEMS

### Rights-of-Way

Because of the large amount, (11%), of privately-owned land within the boundaries of the San Isabel, rights-of-way to timber areas will receive priority consideration in planning. The obtaining of rights-of-way will be scheduled in the 10-year road construction program contained in the working circle plan. Needed rights-of-way will be obtained sufficiently in advance to avoid delaying timber sales.

### Acquisition Program

An aggressive land acquisition program will be carried out which will increase the effectiveness of the timber management program and reduce the right-of-way problem.

### Mining Claims

Although there are a large number of unpatented mining claims on the forest, there has been little conflict with timber management activities. Where mining claims are included in prospective timber sale areas, established policy for use of timber on unpatented land will be followed. Action in each case will be decided on the basis of the particular circumstances.

## COORDINATION WITH OTHER USES

The commercial forest lands in the San Isabel National Forest lie within the "Intermediate Zone" as described in the land management plan. Priorities in this zone are primarily for water and timber and secondarily for wildlife and grazing. Occupancy zones, which may include recreation or roadside areas, occur within this "Intermediate Zone". Primary uses on the recreation or roadside areas are for other than timber production. The overall management objectives, direction and priorities for all zones are provided in the Land Management Plan for the Eastern Colorado Subregion. Land Management block plans and plans for specific resources will be consulted for more detailed policies and instructions. Reference will also be made to FSM 2100, Multiple Use Management.

### Multiple-Use Situation

There are 1,151,640 acres of public land within the San Isabel National Forest. Elevations range from 6,000 feet to 14,431 feet. Yearly precipitation varies from as much as 50 inches in the mountains to 8 inches at the lower elevations. The transition from mountain to the lower elevations of the forest next to the plains is abrupt, both as to elevation and rainfall. The mountain slopes are generally steep and the soils are largely unstable. The forest covers the headwaters of the Arkansas River

whose valley is one of the richest irrigated agricultural developments in the West. Most of the Arkansas River water comes from the watershed within the forest's boundaries.

The population in the nine counties within and adjacent to the forest was estimated in 1957 as 192,000. The forest is also the first mountainous country that tourists from Kansas, Oklahoma, Texas and points east reach when traveling west. During 1958, recreation use on the forest amounted to 1,909,900 recreation visits. This use can be expected to increase.

The forest furnishes 8,894 cow months and 13,014 sheep months of feed per year. During the past decade there has been a considerable downward adjustment in livestock on the forest. In most cases actual use is consistent with the grazing capacity of the range. There is very little conflict between timber production and grazing by domestic animals.

About 426,800 acres of the forest can be considered as timber-producing land. Present timber production is far below potential because of the effects of uncontrolled cutting and wildfires during the early settlement period. This particularly is true in the Salida and Leadville areas. Some of the timbered land cannot be cut over at present because the timber increases in value, and as logging methods change, this timber can be cut. Also, demands of other uses in such areas may, in the future, make multi-purpose access road construction possible. In such cases, deferring harvest of isolated timber stands may be necessary. Much of the area is presently in need of either planting or stand improvement work.

The 1958 estimates of wildlife populations showed 10,000 mule deer, 620 elk, 210 antelope, 510 bighorn sheep and 490 bear. Because of the nearness of large population centers, the hunting demand is sufficient to control big game numbers.

## Multiple-Use Decisions

### Streamside and Waterfront Zones

In these high priority occupancy areas timber cutting will be limited to the removal of insect-infested, diseased and hazardous trees. The cutting, generally, will be very light. Logging slash and debris will be kept out of the streambed and off the banks and will be completely abated on the balance of the area within the zone. Logging roads will be kept as far away from streambanks as is practicable and will be properly drained to keep silting of streams to a minimum. Road crossings of streams will be properly laid out and carefully constructed to minimize soil and streambed disturbance.

Logging camps, mills and landings will not be allowed within these zones. Timber sale contracts will provide for adequate prevention of pollution or of damage to streambanks and natural channels or to lakes or reservoirs.

Roadside Zones

On Highways U. S. 50 and U. S. 6-24, the forest supervisor is authorized to harvest timber for special demonstration purposes, for removal of insect-infested and diseased trees, for safety hazard reduction, and for essential clearing for approved purposes.

Recreation

In areas zoned, under the Land Management Plan, for public use because of the presence of roads, streams or lakes, timber cutting will be modified so that aesthetic values will be protected.

Wildlife

Guidelines as stated in the "Wildlife Coordination Plan" for the San Isabel National Forest will be referred to when preparing for timber sales and when coordinating timber management objectives with proper wildlife management practices.

Openings will be provided in large plantations. Such openings will enhance the snow storage capacity and hence improve watershed conditions as well as being of benefit to wildlife. Wildlife concentration areas will be avoided in selecting plantation sites in the "Intermediate Zone", and the effect of plantations upon wildlife food resources will be considered in selecting such sites in the "Foothill Zone".

Grazing

Some old burns are now being used for grazing by domestic livestock. Grazing will eventually be discontinued in these areas so that they can be returned to timber production. Logging and other timber-use roads will be located so as to avoid natural parks and meadows where practicable, and logging and milling debris will be kept out of such areas.

Water

All timber management activities will be conducted in a manner to protect and, if possible, enhance the water resources of the forest.

Soil

Any phase of timber activity which causes excessive soil loss that is not correctible will be modified or eliminated.

## COOPERATION WITH OTHER AGENCIES

There has been very fine cooperation among the forest, the State Forestry Department and the various counties in fire control. Cooperative agreements for fire control have been signed, or are in the process of being signed by each of the nine counties concerned.

The Great Basin Tent Caterpillar problem in the Cucharas Creek area resulted in a cooperative aerial spraying venture in 1955, 1957 and 1958 with participation by the forest, the State and Huerfano County.

There has been good cooperation between the Forest Service and State agencies such as the Game and Fish Department, the State Reformatory, and the State Highway Department. County highway crews have also been very cooperative.

Federal agencies such as the BLM and the SCS cooperate in fire protection. The Army has furnished helicopters for use in aerial reconnaissance in insect control work.

## SUPPORTING DATA

### History

The present San Isabel National Forest, as proclaimed June 13, 1956, is a consolidation of parts of, or all of, five National Forests. The San Isabel National Forest was proclaimed originally on April 11, 1902. July 2, 1908 the San Isabel was consolidated with the Wet Mountain National Forest which had been proclaimed June 12, 1905. May 27, 1910 the San Isabel National Forest was consolidated with the Las Animas National Forest with certain exclusions located in the area south and east of the Spanish Peaks. The original Las Animas Forest was first proclaimed January 28, 1901. This order, however, was later revoked and a new proclamation for approximately the same area was made February 25, 1907. The Cochetopa National Forest was proclaimed June 13, 1905. This was consolidated with the Leadville National Forest May 26, 1930. Only the lands in the upper Arkansas Valley, which were part of the Leadville National Forest, were consolidated with the Cochetopa National Forest. The San Isabel was combined with the Cochetopa National Forest July 1, 1944, with certain exclusions to the Rio Grande and Gunnison National Forests.

Earliest report of settlement within the San Isabel was the Spanish Fort in the vicinity of La Veta, reported to have been built in 1720. Heavy settlement did not start until over 100 years later. The old Fort, along the Santa Fe Trail at La Veta, was established in 1839. From that time on the population in the area built up rapidly. A flour mill is reported to have been built at Bedito along the Huerfano River in 1850 and it is safe to assume that settlement of that area had been increasing rapidly for the 5-year period previously. The town of Trinidad was first established in 1859 and Walsenburg in 1860. In this area, the settlement preceded the establishment of the National Forest by almost 50 years Consequently, much of the area within the present National Forest was cut over prior to its establishment. The first permanent settlement in Pueblo, east of the Wet Mountains, was established in 1858. It can be concluded that most of the timber used in constructing homes in Pueblo came from the forestland of the Wet Mountains. Consequently, here also, considerable cutting was done prior to the establishment of the National Forest. In the upper Arkansas Valley, settlement began in the late 1850's. Mining operations in the Leadville area began in the early 1870's with the first mill established in 1877. With the coming of the railroads in the early 1880's, logging for bridge timbers, ties and other forms of structural material prospered throughout the area. There were two sawmills operating in the early 80's in the vicinity of Twin Lakes with a third mill located on the South Fork of Lake Creek near Red Mountain in 1895. During the late 70's there were also two or three mills located in the vicinity

of Buena Vista. It is reported that there were four mills operating about this time in the Castle Rock area, one near Black Mountain, one at Wilmonth on Castle Rock Creek, one at the junction of Columbine and Castle Rock Gulch, and one in the vicinity of Coons Park. The method of obtaining the timber had a most detrimental effect on our present stands. One of the early settlers, John Cogan, reports "I heard that the loggers set the fires because they wouldn't let them cut live timber but they could cut dead timber." With the increased mining activities in the Leadville area, large amounts of timber were removed for fuelwood and for charcoal. In 1879, the first charcoal burning was done near Leadville. It is reported that the last burning of timber for charcoal purposes in this area was done in 1890. At one time there were over 5,000 men working in the woods in the vicinity of Leadville to supply lumber and fuel for the mills and mines.

From the above, one can readily see that when the National Forests were created we took over a badly abused and depleted stand of timber for management. The early settlers had over 50 years to cut timber before the establishment of the National Forests.

## ECONOMY

### Population Centers

Table #4

The forest is located in nine counties whose 1957 total estimated population was 192,000. Below are listed the communities in and adjacent to the San Isabel National Forest, with their approximate populations.

| | | | |
|---|---|---|---|
| Leadville | 3,770 | Westcliffe | 340 |
| Buena Vista | 750 | Silver Cliffe | 200 |
| Salida | 5,070 | Gardner | 130 |
| Poncha Springs | 30 | Redwing | 20 |
| Howard | 200 | La Veta | 780 |
| Cotopaxi | 240 | Trinidad | 11,730 |
| Texas Creek | 80 | Walsenburg | 5,500 |
| Canon City | 5,940 | Pueblo | 100,000 |
| Florence | 2,480 | Climax | 250 |
| Portland | 440 | Aguilar | 1,380 |
| Wetmore | 80 | Greenhorn | 20 |
| Beulah | 280 | Mt. Princeton Hot Spgs. | 50 |
| Rye | 250 | Granite | 50 |
| Hillside | 10 | Twin Lakes | 30 |

### Industries

#### Forest

All timber operators within or adjacent to the forest are listed on the succeeding page. Most of these operators are working on private timber.

Table #5

Timber Operators Within or Adjacent to the San Isabel National Forest

| Name of Mill or Operator | Location | Principal Product or Products | Actual Production |
|---|---|---|---|
| Ben Nason | La Veta | Lumber | 50M |
| Don Fennell | Gardner | Lumber | 50M |
| Andrew Vanetti | Walsenburg | Lumber | 200M |
| Sam Halloway | Gardner | Lumber | 10M |
| Earl Thompson | Gulnare | Lumber | 50M |
| Charles Niccoli | Aguilar | Lumber | 25M |
| Austin T. Clark | Weston | Lumber | 50M |
| Davis Duran | Weston | Lumber | 50M |
| Desidero Montoya | Weston | Lumber | 50M |
| Albert Robinson | Weston | Lumber | 50M |
| Dennis Feister, Jr | Aguilar | Lumber | 50M |
| Whiting Brothers | Ophir Creek | Lumber | 1,500M |
| Lee Seabolt | Rosita | Ties | 30M |
| Kenneth Hoza | Florence | Ties | 30M |
| Jim Viola | Florence | Lumber | 600M |
| Bill Bant | Ophir Creek | Lumber | 1,000M |
| Charlie Jones | Beulah | Lumber | 750M |
| Sen Martinez | Rye | Lumber | 100M |
| Cauffman | Westcliffe | Lumber | 30M |
| Smith | Leadville | Finished Lumber | 260M |
| Cureton | Granite | Rough Lumber | 200M |
| Holmes | Twin Lakes | Rough Lumber | 200M |
| Hogan | Leadville | Rough Lumber | 0 |
| Savory | Leadville | Rough Lumber | 0 |
| Wm. E. Turner | Buena Vista | Lumber & Bldg. Logs | 60M |
| C. E. Evans | Salida | Lumber | 1,500M |
| H. DeLuca | Poncha Spgs. | Lumber and Mine Ties | 25M |

From the list of operators showing actual production, as shown in Table #6, and from the record of past cuts on the forest, it can be seen that the timber resource does not have any great effect upon the economy of this area. In the past, there was a good demand for mine props in the Trinidad-Walsenburg area for use in the coal mines located there; however, with the closing of most of the coal mines, the mine prop market has almost completely vanished. In the Salida area, the Koppers Company formerly maintained a treating plant. With the abandonment of the narrow gauge railroad from Salida to Gunnison, and converting the narrow gauge from Salida to the quarry at Monarch to standard gauge track, the Koppers Company treating plant closed and the market for ties has also vanished. City ordinances in Pueblo prohibit the use of native lumber in structural form in this town. This is due to a local prejudice rather than to any structural deficiencies in the lumber. Although the building program in and around Pueblo is presently expanding, little or no native lumber is used. Most lumber cut in the working circle is shipped to Denver and eastern markets.

Other Industries

Climax Molybdenum Company operates the largest molybdenum mine in the country at Climax. The American Smelting and Refining Company operates a plant at Leadville to accommodate the mines operating in that area for lead and zinc. The Colorado Fuel and Iron Corporation of Pueblo operates a limestone quarry at Monarch just west of Salida. They also operate a large coal mine at Weston just west of Trinidad.

The cement industry is prominent at Portland, headquarters of the Portland Cement Company;also, one small cement plant is located at Florence.

A feldspar mine is operating just east of Salida in Railroad Gulch. In addition, there are scattered small mines throughout the entire forest. None of these, however, employ more than three or four men. Mining activity is also centered around Rosita.

The Arkansas Valley from Leadville to Howard is good farming country, particularly cattle raising, as is the Wet Mountain Valley in the vicinity of Westcliffe. Irrigated farms and fruit ranches are scattered along the Arkansas Valley from Canon City to Pueblo. The area from Pueblo south including the Huerfano Valley is mostly cattle country.

The tourist and recreational business affords the greatest source of income to the area adjacent to the forest. Many of the smaller communities are building up their tourist attractions and accommodations and are becoming more dependent upon this type of business annually. Though confined mostly to the weekends, winter sports activities at Cooper Hill and Climax, near Leadville, greatly aid

the economic situation in that particular area.

## PHYSIOGRAPHY

### Topography

The west side of the working circle from Tennessee Pass, north of Leadville, to Mt. Blanca in the Sangre de Cristo range is characterized by steep canyons. In general, the drainages run east from the Continental Divide and the Sangre de Cristo Divide into the Arkansas River. These canyons range from 6 miles in length, within the forest boundary in the area between Poncha Pass and Mt. Blanca, to 12 miles in length in the area between Poncha Pass and Tennessee Pass.

The east side of the working circle from Tennessee Pass south to Buffalo Peaks is characterized by the rough topography of the west slope of the Mosquito Range. South from Buffalo Peaks to the forest boundary just east of Salida the topography is more rolling with a 3-mile-wide strip along the foothills containing numerous rock outcroppings rendering the area generally inaccessible.

The Wet Mountains, which lie east of the Sangre de Cristo Range, are characterized on the north by rough, rocky slopes generally unsuitable for logging. A wide, rolling ridge running north and south with spurs to the east and west is operable. The center portion of the Wet Mountains, immediately west of Beulah and continuing to the west forest boundary of the Wet Mountains, is steep to rolling country. The area south of Greenhorn Mountain is extremely rough rocky country definitely unsuitable for logging.

The Spanish Peaks area in general is rough with steep slopes, large rockslides and rock walls radiating from the mountains and extending into the foothills. About half of this area, however, is less rough and generally suitable to logging.

## SOILS

A general soils map is shown below on Figure 5.

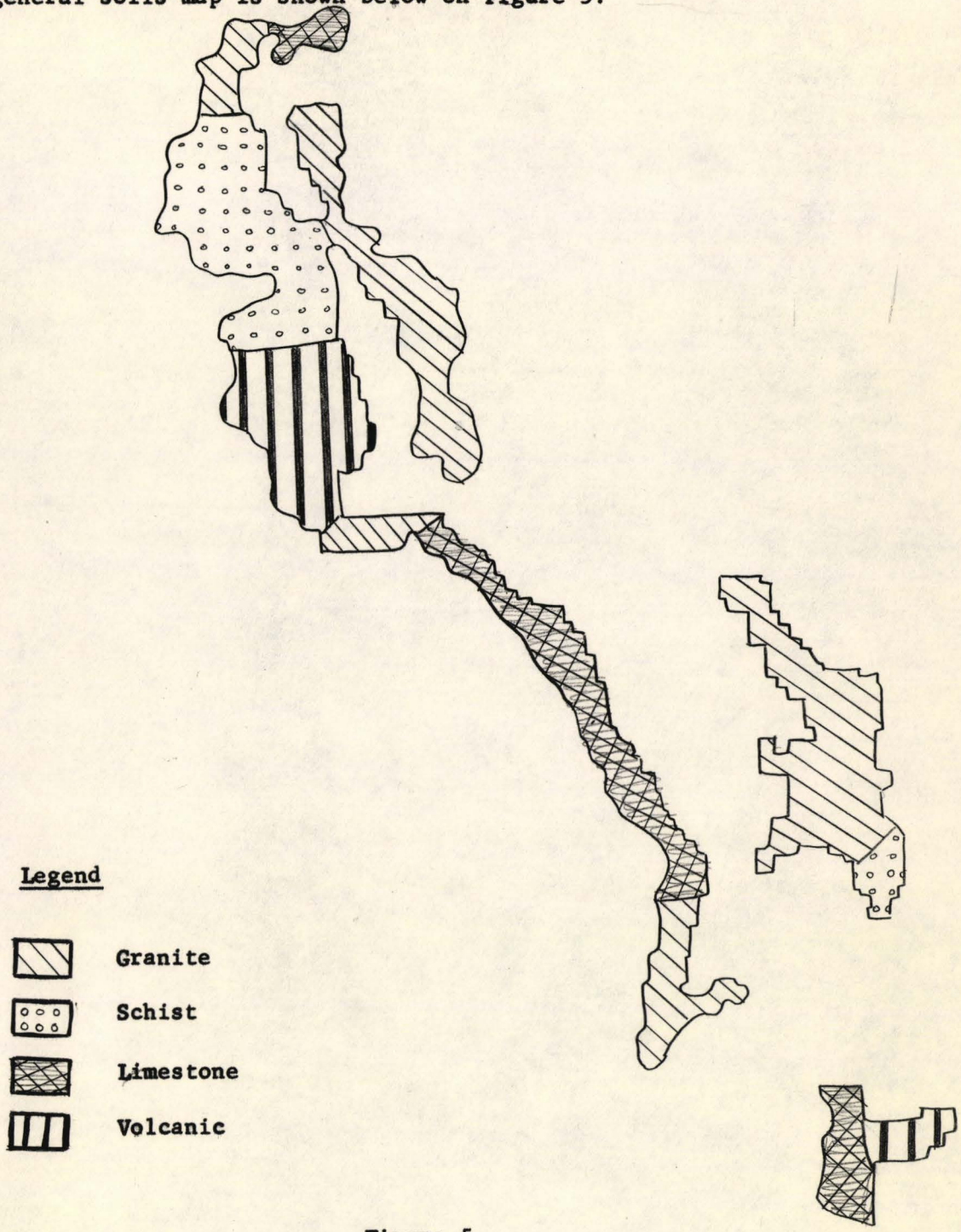



Figure 5

## Climate

### (a) Precipitation

Average annual precipitation varies from approximately 8 inches in the Gardner and Trout Creek, 4-Mile - 7-Mile area northeast of Salida to 25 to 50 inches in the higher elevations of the Sangre de Cristo and Collegiate Peaks range. About 50% of the moisture at the higher elevations falls in the form of snow from late fall throughout the winter. The remainder of the moisture falls in the spring and early summer in the form of thundershowers. The area northeast of Salida and throughout the Wet Mountains is characterized by storms of cloudburst intensity. This situation, combined with the erosive nature of the soils in these areas, dictates the need for extreme care in logging.

### (b) Winds

Winds are generally westerly. The broken character of the terrain holds wind velocities down so that they are not of a serious nature. The direction of the drainage will determine wind direction to the greatest extent and all logging by groups, patches or strips should recognize this fact.

### (c) Temperature Range, Growing Season

There is an extreme range in temperatures within the working circle. In the foothills area, from Buena Vista south through the Spanish Peaks, summer temperatures range as high as 90° during the summer. Temperatures north of Buena Vista, in the foothills, seldom exceed 75°. At the higher elevations throughout the working circle, summer daytime temperatures range from 50 to 70° while, in the winter, temperatures drop to 40 to 50° below zero. The frost-free period will vary from 4½ months at the lower elevations to 1-1/3 months at the higher elevations.

## Table #6

## REPORT OF TIMBER CUT AND SOLD SINCE 1915

| | No. Sales | MBM | Value | Avg. Sell. Price | MBM | Value | Avg. Sell. Price |
|---|---|---|---|---|---|---|---|
| 1915 FY | 46 | 429 | 518 | 1.21 | 309 | 492 | 1.59 |
| 1916 FY | 56 | 617 | 866 | 1.40 | 685 | 776 | 1.13 |
| 1917 FY | 56 | 1,497 | 1,357 | .91 | 683 | 1,159 | 1.70 |
| 1918 FY | 68 | 987 | 1,568 | 1.59 | 568 | 781 | 1.38 |
| 1919 FY | 35 | 410 | 733 | 1.79 | 440 | 810 | 1.84 |
| 1920 FY | 73 | 861 | 1,917 | 2.08 | 601 | 1,293 | 2.15 |
| 1921 FY | 64 | 788 | 1,637 | 2.23 | 783 | 1,623 | 2.07 |
| 1922 CY | 88 | 1,413 | 3,167 | 2.27 | 1,273 | 2,966 | 2.33 |
| 1923 CY | 55 | 800 | 1,502 | 1.88 | 756 | 1,629 | 2.15 |
| 1924 CY | 88 | 4,500 | 12,140 | 2.70 | 912 | 1,985 | 2.18 |
| 1925 CY | 38 | 784 | 1,340 | 1.71 | 1,695 | 4,021 | 2.37 |
| 1926 CY | 35 | 766 | 1,333 | 1.74 | 1,008 | 2,176 | 2.16 |
| 1927 CY | 59 | 4,616 | 9,752 | 2.11 | 1,278 | 3,190 | 2.50 |
| 1928 CY | 51 | 11,099 | 27,146 | 2.45 | 2,652 | 6,004 | 2.26 |
| 1929 CY | 25 | 3,855 | 9,836 | 2.55 | 1,434 | 4,184 | 2.92 |
| 1930 CY | 71 | 4,364 | 13,770 | 3.16 | 2,575 | 6,241 | 2.42 |
| 1931 CY | 35 | 539 | 989 | 1.83 | 1,195 | 3,155 | 2.64 |
| 1932 CY | 35 | 148 | 260 | 1.76 | 949 | 2,298 | 2.42 |
| 1933 FY | 28 | 195 | 401 | 2.06 | 924 | 2,074 | 2.24 |
| 1934 FY | 44 | 4,214 | 9,718 | 2.31 | 993 | 2,343 | 2.36 |
| 1935 FY | 57 | 534 | 847 | 1.59 | 1,241 | 2,749 | 2.22 |
| 1936 FY | 32 | 700 | 1,452 | 2.07 | 1,385 | 3,089 | 2.23 |
| 1937 FY | 34 | 1,811 | 3,889 | 2.15 | 2,209 | 5,290 | 2.39 |
| 1938 FY | 48 | 522 | 745 | 1.43 | 1,340 | 3,434 | 2.56 |
| 1939 FY | 35 | 2,922 | 7,478 | 2.56 | 1,048 | 2,685 | 2.56 |
| 1940 FY | 56 | 419 | 697 | 1.66 | 1,481 | 3,319 | 2.24 |
| 1941 FY | 40 | 1,467 | 3,917 | 2.67 | 1,138 | 2,955 | 2.60 |
| 1942 FY | 36 | 3,656 | 9,600 | 2.63 | 990 | 2,503 | 2.53 |
| 1943 FY | 33 | 11,686 | 37,573 | 3.22 | 1,570 | 4,431 | 2.82 |
| 1944 FY | 30 | 2,000 | 6,389 | 3.19 | 2,249 | 6,839 | 3.04 |
| 1945 FY | 88 | 3,394 | 10,915 | 3.22 | 4,445 | 13,612 | 3.06 |
| 1946 FY | 72 | 1,267 | 3,603 | 2.84 | 3,104 | 9,614 | 3.10 |
| 1947 FY | 68 | 3,168 | 14,373 | 4.54 | 4,546 | 14,782 | 3.25 |
| 1948 FY | 60 | 2,982 | 15,339 | 5.14 | 1,971 | 7,150 | 3.63 |
| 1949 FY | 67 | 1,359 | 5,622 | 4.14 | 2,627 | 10,578 | 4.03 |
| 1950 FY | 87 | 667 | 2,274 | 3.41 | 3,000 | 11,883 | 3.96 |
| 1951 FY | 75 | 882 | 3,574 | 4.05 | 2,230 | 9,191 | 4.12 |
| 1952 FY | 52 | 1,116 | 4,424 | 3.96 | 1,267 | 5,293 | 4.18 |
| 1953 FY | 40 | 11,928 | 74,918 | 6.28 | 2,032 | 9,692 | 4.77 |
| 1954 FY | 39 | 497 | 2,299 | 4.26 | 1,327 | 8,258 | 6.22 |
| 1955 FY | 37 | 680 | 3,317 | 4.88 | 2,258 | 13,055 | 5.78 |
| 1956 FY | | 971 | 6,334 | 6.52 | 1,997 | 11,508 | 5.76 |
| 1957 FY | 15 | 2,187 | 27,449 | 12.55 | 2,047 | 12,385 | 6.05 |
| 1958 FY | 50 | 413 | 2,706 | 6.55 | 2,117 | 13,252 | 6.26 |
| 1959 FY | 30 | 223 | 1,066 | 4.78 | 1,308 | 5,869 | 4.49 |

# TIMBER MANAGEMENT PLAN

## SAN ISABEL WORKING CIRCLE

San Isabel National Forest
Colorado
Region 2
July 1, 1962 - June 30, 1972

Submitted March 27, 1962 By /S/ Thomas C. Evans

Reviewed and Recommended for Approval:

Forest Supervisor /S/ John F. Douglas 3/29, 1962

Division of Timber Management /S/ C. C. Averill 4/9, 1962

Engineering /S/ Marion Lamb 4/9, 1962

Acting Regional Forester /S/ H. C. Eriksson 4/11, 1962

Approved May 4, 1962

/S/ W. S. Swingler
Acting Chief

(D.J.M.)

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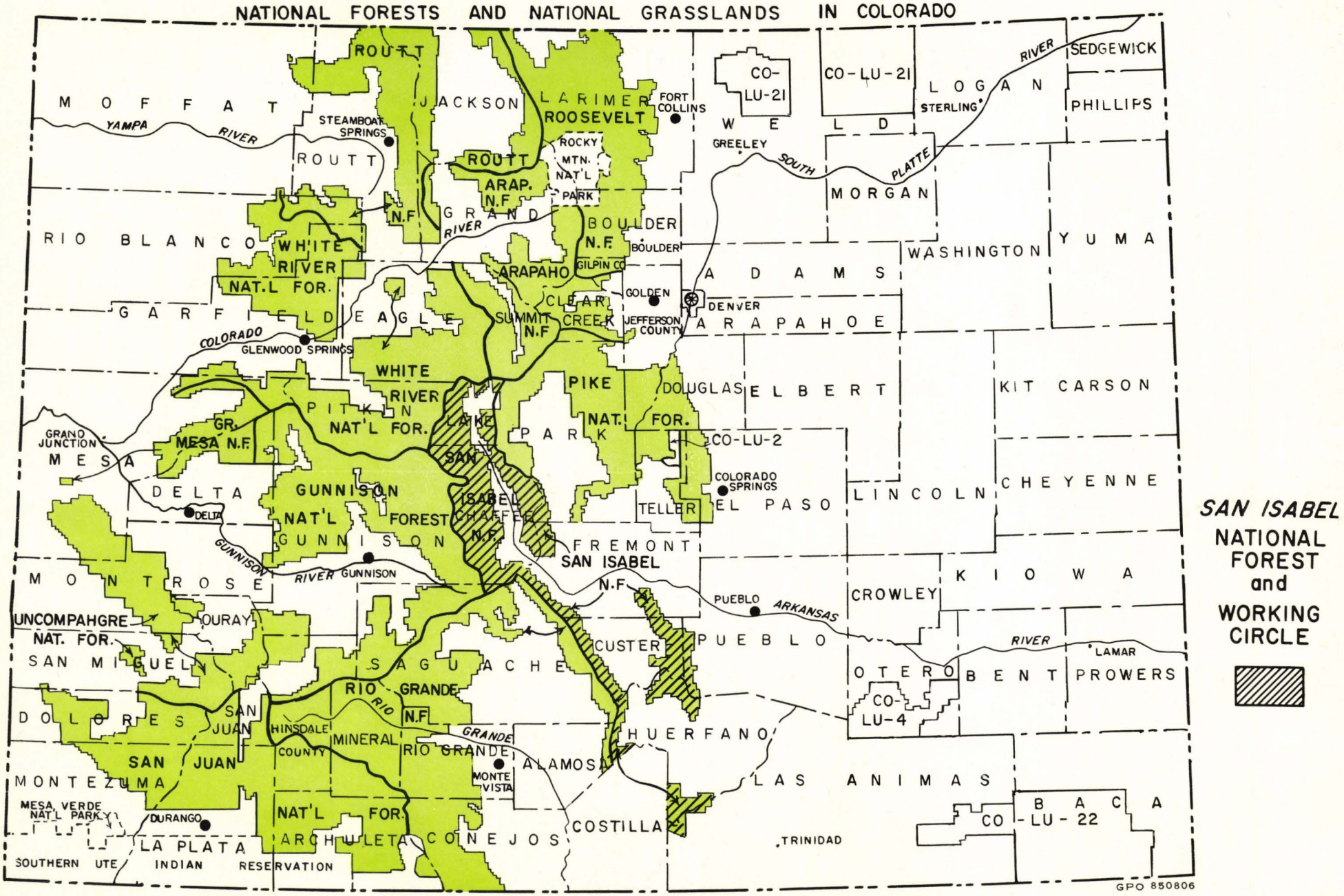

NATIONAL FORESTS AND NATIONAL GRASSLANDS IN COLORADO
ROUTT
JACKSON
LARIMER
ROOSEVELT
FORT COLLINS
CO-LU-21
CO-LU-21
SEDGEWICK
PHILLIPS
LOGAN
STERLING
RIVER
MOFFAT
YAMPA RIVER
STEAMBOAT SPRINGS
ROUTT
ROUTT N.F.
ARAP. N.F.
ROCKY MTN. NAT'L PARK
GREELEY
SOUTH PLATTE RIVER
MORGAN
GRAND RIVER
BOULDER N.F.
BOULDER
RIO BLANCO
WHITE RIVER NAT.L FOR.
ARAPAHO
GILPIN CO
WASHINGTON
YUMA
ADAMS
GOLDEN
DENVER
GARFIELD
EAGLE
CLEAR CREEK
SUMMIT N.F.
JEFFERSON COUNTY
ARAPAHOE
COLORADO
GLENWOOD SPRINGS
WHITE RIVER
PIKE NAT. FOR.
DOUGLAS
ELBERT
KIT CARSON
PITKIN
GR. MESA N.F.
LAKE
PARK
CO-LU-2
GRAND JUNCTION
MESA
DELTA
GUNNISON NAT'L FOR.
SAN ISABEL N.F.
COLORADO SPRINGS
TELLER
EL PASO
LINCOLN
CHEYENNE
DELTA
GUNNISON
GUNNISON RIVER
FREMONT
SAN ISABEL N.F.
MONTROSE
GUNNISON
KIOWA
CROWLEY
PUEBLO
ARKANSAS RIVER
UNCOMPAHGRE NAT. FOR.
OURAY
CUSTER
PUEBLO
SAN MIGUEL
SAGUACHE
RIO GRANDE N.F.
OTERO
BENT
PROWERS
LAMAR
DOLORES
SAN JUAN
HINSDALE COUNTY
MINERAL
RIO GRANDE
HUERFANO
CO-LU-4
SAN JUAN
ALAMOSA
MONTE VISTA
MONTEZUMA
LAS ANIMAS
MESA VERDE NAT'L PARK
DURANGO
NAT'L FOR.
ARCHULETA
CONEJOS
COSTILLA
BACA
CO-LU-22
LA PLATA
TRINIDAD
SOUTHERN UTE INDIAN RESERVATION
SAN ISABEL
NATIONAL FOREST and WORKING CIRCLE
GPO 850806

## SUMMARY OF PLAN

### Table 1

Annual Allowable Cut From Regulated Area

| Type | Area Acres | Volume Cubic Feet M C.F. | Volume Board Feet Scrib. Dec. C M B.F. |
|---|---|---|---|
| Harvest Cut | | | |
| Douglas-fir | 440 | 500 | 1,500 |
| Ponderosa Pine | 1,260 | 700 | 2,000 |
| Lodgepole Pine | 1,360 | 2,200 | 1,500 |
| Spruce-Fir | 690 | 1,600 | 5,000 |
| Total | 3,750 | 5,000 | 10,000 |

Volume By Species From the Regulated Area

| Species | Sawtimber Types: Douglas-fir M B.F. | Ponderosa Pine M B.F. | Lodgepole Pine M B.F. | Spruce-Fir M B.F. | Total M B.F. |
|---|---|---|---|---|---|
| Douglas-fir | 990 | 580 | 15 | 50 | 1,635 |
| Ponderosa Pine | 90 | 1,200 | - | - | 1,290 |
| Lodgepole Pine | 45 | 40 | 1,110 | 100 | 1,295 |
| White Fir | 150 | 120 | - | - | 270 |
| Subalpine Fir | - | - | 15 | 350 | 365 |
| Engelmann Spruce | 195 | - | 360 | 4,500 | 5,055 |
| Blue Spruce | 30 | 60 | - | - | 90 |
| Total | 1,500 | 2,000 | 1,500 | 5,000 | 10,000 |

Table 2

Total Volume In Unregulated Types

| Type | Area Thousand Acres | Volume MM C.F. |
|---|---|---|
| Aspen, Poletimber | 82 | 90 |

Table 3

Area By Ownership, Land Classification and Stand Size Classes

Thousand Acres

| Land Classification and Stand Size Class | National Forest | Ownership State, County & Municipal | Private | Total |
|---|---|---|---|---|
| Commercial Forest Land - Unreserved | | | | |
| Sawtimber | 270 | 5 | 29 | 304 |
| Poletimber | 279 | 4 | 32 | 315 |
| Seedling-Saplings | 40 | 1 | 4 | 45 |
| Nonstocked | 10 | | | 10 |
| Total | 599 | 10 | 65 | 674 |
| Noncommercial | 180 | 2 | 15 | 197 |
| Non-forest | 310 | 4 | 40 | 354 |
| Grand Total | 1,089 | 16 | 120 | 1,225 |

Table 4

Area of National Forest Unreserved Commercial Forest Lands
By Types, Stand Size Classes and Stocking Classes

Thousand Acres

| Type | Stand Size and Stocking Class | | | | | | | | | | | | | Total | Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sawtimber | | | | Poletimber | | | | Seedling-Saplings | | | | | | |
| | Well | Med. | Poor | Total | Well | Med. | Poor | Total | Well | Med. | Poor | Total | Nonstocked | | |
| Douglas-fir | - | 27 | 44 | 71 | 24 | 19 | 2 | 45 | - | - | - | - | - | 116 | 19 |
| Ponderosa Pine | - | 9 | 52 | 61 | 1 | 13 | 8 | 22 | - | - | - | - | - | 83 | 14 |
| Lodgepole Pine | - | 10 | 15 | 25 | 36 | 33 | 3 | 72 | 10 | 2 | 1 | 13 | - | 110 | 18 |
| White Pine Group | - | - | 2 | 2 | - | 3 | 1 | 4 | - | - | - | - | - | 6 | 1 |
| White Fir | - | 1 | 1 | 2 | 2 | - | - | 2 | - | - | - | - | - | 4 | 1 |
| Spruce-Fir | 1 | 60 | 47 | 108 | 11 | 31 | 11 | 53 | - | 1 | 1 | 2 | 10 | 173 | 29 |
| Total Conifers | 1 | 107 | 161 | 269 | 74 | 99 | 25 | 198 | 10 | 3 | 2 | 15 | 10 | 492 | 82 |
| Hardwoods | | | | 1 | | | | 81 | | | | 25 | - | 107 | 18 |
| Grand Total | | | | 270 | | | | 279 | | | | 40 | 10 | 599 | |
| Percent | | | | 45 | | | | 47 | | | | 6 | 2 | | 100 |

Table 5

Total Volume for Commercial Forest Lands
By Species Group and Ownership

| Species Group and Ownership | Total Volume | | |
|---|---|---|---|
| | Cubic Feet | | Board Feet |
| | Trees 5.0-10.9" D.B.H. | Trees 11.0"+ D.B.H. | Scribner Decimal C |
| | MM C.F. | MM C.F. | MM B.F. |
| Softwood Types | | | |
| National Forest | 366 | 294 | 1,329 |
| State, County, etc. | 5 | 4 | 24 |
| Private | 29 | 24 | 143 |
| Total | 400 | 322 | 1,496 |
| Hardwood Types | | | |
| National Forest | 83 | 7 | 5 |
| State, County, etc. | 1 | 0 | - |
| Private | 11 | 1 | - |
| Total | 95 | 8 | 5 |
| Grand Total | | | |
| National Forest | 449 | 301 | 1,334 |
| State, County, etc. | 6 | 4 | 24 |
| Private | 40 | 25 | 143 |
| Total | 495 | 330 | 1,501 |

Table 6

Summary of Total Area, Net Volume Per Acre and Total Volume By Species
For Major Sawtimber Types - National Forest Unreserved Lands
Scribner Dec. C Log Rule - Trees 9.0 Inches D.B.H. and Larger

| | Types | | | | | | |
|---|---|---|---|---|---|---|---|
| | Douglas-fir | Ponderosa Pine | Lodgepole Pine | White Fir | Spruce-Fir | Total | Percent |
| Area M Acres | 71 | 61 | 25 | 2 | 108 | 267 | |
| Volume Per Acre B.F. | 3,665 | 1,729 | 4,547 | 3,984 | 7,775 | 4,970 | |
| Volume By Species MM B.F. | | | | | | | |
| Douglas-fir | 164 | 30 | 1 | 2 | 8 | 205 | 15 |
| Ponderosa Pine | 16 | 64 | - | - | | 80 | 6 |
| Lodgepole Pine | 8 | 2 | 79 | - | 17 | 106 | 8 |
| Limber Pine | 10 | 1 | 8 | 1 | 8 | 28 | 2 |
| White Fir | 23 | 5 | - | 5 | - | 33 | 3 |
| Subalpine Fir | - | - | 1 | - | 59 | 60 | 5 |
| Engelmann Spruce | 31 | - | | - | 748 | 779 | 59 |
| Blue Spruce | 5 | 3 | 25 | - | - | 33 | 2 |
| Total Conifers | 257 | 105 | 114 | 8 | 840 | 1,324 | 100 |
| Aspen | 3 | - | - | - | - | 3 | - |
| Grand Total | 260 | 105 | 114 | 8 | 840 | 1,327 | 100 |

## Table 7

Summary of Net Annual Growth
By Major Types and Type of Volume

| Type and Stand Size Class | Area | Annual Net Growth Per Acre | | | Total Annual Net Growth | | |
|---|---|---|---|---|---|---|---|
| | | Board Feet | | | Board Feet | | |
| | | Int. ¼" | Scrib. Dec. C | Cubic Feet | Int. ¼" | Scrib. Dec. C | Cubic Feet |
| | Acres | B.F. | B.F. | C.F. | M B.F. | M B.F. | M C.F. |
| Douglas-fir | | | | | | | |
| Sawtimber | 70,951 | 11.77 | 9.93 | 2.56 | 835.09 | 704.54 | 181.63 |
| Ponderosa Pine | | | | | | | |
| Sawtimber | 61,370 | 7.52 | 6.30 | 1.49 | 461.50 | 386.63 | 91.44 |
| Lodgepole Pine | | | | | | | |
| Sawtimber | 25,007 | 4.92 | 4.48 | 1.16 | 123.03 | 112.03 | 29.01 |
| Poletimber | 71,650 | | | 1.78 | | | 127.54 |
| Spruce-Fir | | | | | | | |
| Sawtimber | 107,547 | 20.73 | 18.09 | 5.40 | 2,229.45 | 1,945.52 | 580.75 |

## Table 8

Recommended Rotations and Adjustment Periods

| Type | Adjustment Period | Rotation |
|---|---|---|
| | Years | Years |
| Douglas-fir | 100 | 140 |
| Ponderosa Pine | 40 | 140 |
| Lodgepole Pine | 50 | 120 |
| Spruce-Fir | 100 | 140 |

Revision Date -- June 30, 1972.

TIMBER MANAGEMENT PLAN
For The

SAN ISABEL NATIONAL FOREST

## INTRODUCTION

The San Isabel Working Circle timber management plan constitutes the 10-year action program for the working circle. The plan prescribes the action necessary to meet the long term objectives in the General Timber Management Statement for the San Isabel National Forest.

This plan will be revised by June 30, 1972, and sooner if necessary to meet changing conditions.

Detailed Forest Survey data from which this plan was formulated are found on the IBM sheets labeled "1957 Forest Survey, Colorado, IBM Sheets, San Isabel National Forest, Sample Unit #26," and filed in the office of the Forest Supervisor at Pueblo,Colorado.

Atlas binders containing compartment records and maps with compartment descriptions, including area and volume breakdown by types, are kept in the rangers' offices. These records will be kept current for action taken within the compartments.

## SUMMARY OF RESULTS UNDER PREVIOUS PLANS

The San Isabel Working Circle plan, as described in the General Timber Management Statement, consolidates the Huerfano, Arkansas River, Las Animas, Poncha, San Carlos, and Westcliffe Working Circles into one. The last revision of the working circle plans was during the period 1944-1954. The plans established a total allowable cut of 13.3 million board feet for the forest. An interim allowable cut of 9.0 MM B.F. was set in 1957 pending consolidation of the working circles and revision of the management plan.

During the period of 1952-1961, the San Isabel Working Circle's actual cut was 16.4 percent of the allowable cut. The actual cut fell far short because of the lack of roads, the excessive cost of access per unit of volume and the lack of an agressive timber sales program.

A comparison of the actual and allowable cut is shown on page 9.

### Timber Stand Improvement and Reforestation Accomplishments

Very little stand improvement work has been done during the past 10 years.

### Protection Accomplishments

### Disease Control

Control of dwarfmistletoe (*Arceuthobium vaginatum* forma *cryptopodum* (Engelm.) Gill) has been started on a 6,000-acre ponderosa pine tract.

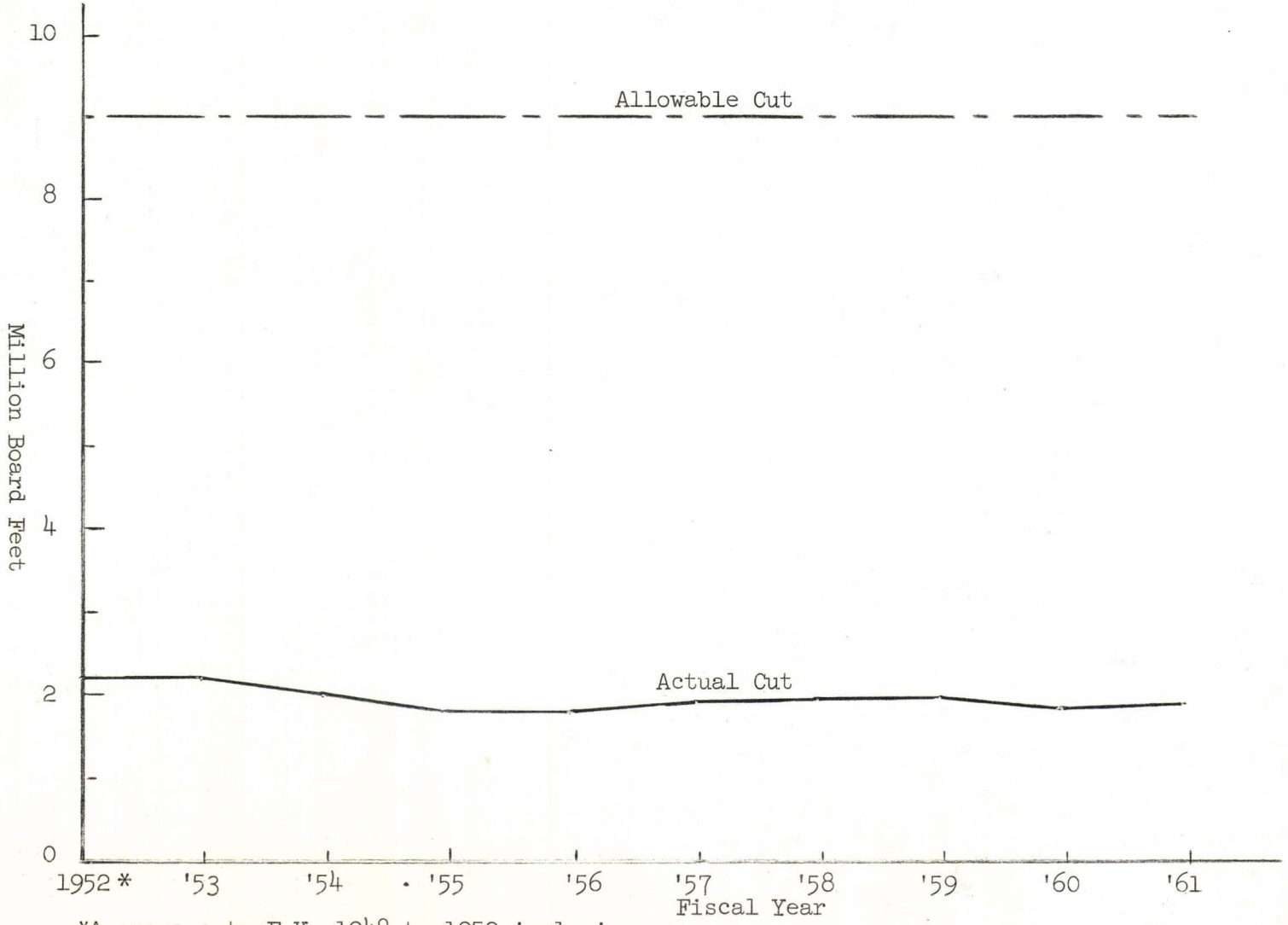
### Fire Control

During the period 1952 through 1961 the San Isabel National Forest had a total of 227 fires -- burning about 416 acres. No fire exceeded 100 acres in size. The average acreage burned per year has been 42 acres, compared with a burned area objective of 1,220 acres per year.

Chart 1

Comparison of Allowable Cut
and Five-Year Average Cut

F. Y. 1952 - 1961




*Average cut, F.Y. 1948 to 1952 inclusive.

## MANAGEMENT OBJECTIVES

The objective of this plan is to set up a 10-year program that will enable the accomplishment, by the year 2000, of the long-range objectives as stated in the General Timber Management Statement.

In general the objectives for the next 10 years will be --

1. Attain the allowable cut for the working circle by F.Y. 1972. This will mean greatly increasing the cut of both sawtimber and poletimber.

2. Work with adjacent forests toward the establishment of a fibre industry that would use small round products and low value sawtimber-size material.

3. Examine the 10,000 acres classed as nonstocked and set up a reforestation program to accomplish 50 percent of necessary planting during this period.

4. Examine the 106,000 acres of aspen type and the 116,000 acres of Douglas-fir as to condition class and prepare management prescriptions. This will be included with the compartment descriptions and will be done by 1967.

5. Assure adequate stocking within three years after cutting on all timber sale areas. Use approved methods of ground preparation that aid natural regeneration.

6. Prevent epidemic outbreaks of destructive forest insects.

7. Reduce infections of dwarfmistletoe in ponderosa pine through cutting, using approved silvicultural methods.

8. Keep commercial forest land fire damage within PAR established in the fire plan.

## REGULATION

Regulation will be by area, with the allowable cut expressed in both area and volume. Control will be by 10-year periods. Undercuts that have built up during the period may be cut during the remainder of the same period, provided that the total cumulative cut does not exceed the allowable periodic cut by more than 10 percent. The control of the allowable cut will be by type area and not by species or products cut within the type. Sales programs will be by species and products and will be in volumes sufficient to meet area control objectives. Sales programs will normally exceed allowable cut objectives; otherwise the average annual cut will fall short of meeting the 10-year objective. Emphasis will be placed on increasing the current actual cut until experience shows the allowable cut objectives are assured.

The financed cut for any one year is based upon volume and includes the cut from both the regulated and unregulated areas. The financial cut quota should be sufficient to meet both volume and area objectives for the forest as a whole.

If the present relationship between area and volume is found to be out of proportion for the forest as a whole, the volume will be adjusted to be consistent with area regulation. No adjustment, however, will be made prior to the end of the first five-year period.

The major sawtimber types are Douglas-fir, ponderosa pine, lodgepole pine, and spruce-fir and all four of these types will be regulated. The white fir and limber pine types are very limited in area. Any cutting in these latter types will be charged to the adjacent major type.

There is no foreseeable market for aspen during this planning period. Cutting in this type will not be regulated until markets are developed for the product.

### Rotations

Previous plans used rotations of 160 years to calculate the allowable cut. This plan uses 50 and 100-year adjustment periods to convert wild stands to managed stands. Better information is needed to establish the length of the rotation, and this will be collected during the next 10 years.

For the purpose of using the Kemp formula as a comparison with the tabulation method of determining the allowable cut, the following rotations are used:

| | |
|---|---|
| Douglas-fir Type | 140 years |
| Ponderosa Pine Type | 140 years |
| Lodgepole Pine Type | 120 years |
| Spruce-Fir Type | 140 years |

Method of Cutting

Region 2's Timber Management Guides, FSH2-2442.8, will be applied in designating timber for cutting. These guides provide for clear cutting by blocks, patches, strips or groups with even-age management as the objective.

No cutting is contemplated within the roadside zones of inter-regional highways, such as U.S. 50 and U.S. 285, during this planning period. The forest supervisor may prescribe cutting of timber in roadside zones of system roads as well as State and Federal highways only for the purpose of protecting, improving or maintaining the timber stands. Approval of the timber sale contract constitutes approval of the cutting in such zones. The necessity of such cutting will, of course, be fully explained in the presale prescription.

Cutting of timber in established recreation areas will be in accordance with the recreation plan for the specific area.

Presale prescriptions will set up the requirements for each sale in accordance with directions in the Multiple-Use Management Guides for Eastern Colorado, and forest and ranger district plans.

This working circle is very popular as a recreation area and this use is increasing very rapidly. It is essential that a good timber management job be done in order to maintain good aesthetics in areas used by the public. An acceptable appearance can normally be obtained in cutover areas in the special treatment zones by manipulating the size and shape of the clear-cut groups, patches or strips to fit local needs and doing a satisfactory slash disposal job.

Growing Stock

The forest inventory divides the major timber types into stand size classes and stocking classes. The definitions for these classes are Forest Survey standards.

The standard tree-size classes are --

| | |
|---|---|
| Sawtimber | 11.0 inches and larger d.b.h. |
| Poletimber | 5.0 inches to 10.9 inches d.b.h. |
| Seedling-Sapling | 1/2 foot high to 4.9 inches d.b.h. |

Stocking class or crown density class refers to the extent to which growing space is utilized by present growing stock trees of commercial species. The classification is based on the percent of crown closure. The stocking classes for sawtimber stands, as used in this plan, are for the percent of closure of sawtimber crowns. The stocking classes for poletimber and seedling-sapling stands are based on crown closure for all trees, regardless of their size.

| Classification | Percent of Crown Closure |
|---|---|
| Nonstocked | 0 to 9 |
| Poorly Stocked | 10 to 39 |
| Medium Stocked | 40 to 69 |
| Well Stocked | 70+ |

Condition classes were not used in the survey. The breakdown into stand size classes is purely on size and does not reflect the growing potential of the trees into the next larger size class. For example, considerable area of lodgepole pine that may never grow into sawtimber was typed out as poletimber. The trees are overcrowded and too old to put on additional growth. The lands supporting such overaged and stagnated stands can be put into growing condition only by removing the present stand and reforesting the area.

Table 9 summarizes the distribution of stand size classes for the four regulated types. Since very little of the lodgepole pine poletimber is likely to grow to a larger stand size class, 88 percent of the lodgepole pine type is now ready for a harvest cut. For the other types only the sawtimber-sized timber is ready for cutting.

The operability factor was obtained by discounting the area to exclude scattered small tracts requiring extremely large expenditures for road access, poorly stocked areas on steep, rocky slopes, fringes of unmerchantable timber at timber line, areas with a complex land ownership pattern, and heavily used recreation areas.

Table 9

Distribution of Stand Size Classes
For Regulated Types

| Stand Size Class | Douglas-fir Type | | | Ponderosa Pine Type | | |
|---|---|---|---|---|---|---|
| | M Acres | Percent of Type | Percent Operable | M Acres | Percent of Type | Percent Operable |
| Sawtimber | 71 | 61 | | 61 | 73 | |
| Poletimber | 44 | 38 | | 22 | 27 | |
| Seedling-Sapling | 1 | 1 | | 0 | 0 | |
| Nonstocked | 0 | 0 | | - | 0 | |
| Total | 116 | 100 | 60 | 83 | 100 | 80 |

| Stand Size Class | Lodgepole Pine Type | | | Spruce-Fir Type | | |
|---|---|---|---|---|---|---|
| | M Acres | Percent of Type | Percent Operable | M Acres | Percent of Type | Percent Operable |
| Sawtimber | 25 | 23 | | 108 | 62 | |
| Poletimber | 72 | 65 | | 53 | 31 | |
| Seedling-Sapling | 13 | 12 | | 2 | 1 | |
| Nonstocked | 0 | 0 | | 10 | 6 | |
| Total | 110 | 100 | 70 | 173 | 100 | 60 |

## Growth and Mortality

Growth and mortality are based on forest survey data. The calculation is explained under "Supporting Data." Table 10 shows the growth and mortality for the sawtimber types. The net annual growth is 7.5 board feet, Scribner Decimal C, per acre for all sawtimber types, based on the past 10 years.

The total annual net growth and mortality for the sawtimber type is:

| Kind of Volume | Total Annual Net Growth | Total Annual Mortality |
|---|---|---|
| Scribner Dec. C | 3,156 M B.F. | 1,146 M B.F. |
| International $\frac{1}{4}$" | 3,657 M B.F. | 1,373 M B.F. |
| Cubic Feet | 1,096 M C.F. | 449 M C.F. |

Mortality is due largely to disease. Most of the sawtimber is overaged and mortality can be expected to increase until such time that the overaged timber is harvested.

Empirical yield tables are not available as no experience has been built up on what can be expected under management. However, it is estimated that a potential growth of from 100 to 200 board feet per acre per year, depending on the sites, can be expected under good management.

Prior to the end of this planning period the growth and mortality will be re-examined. If there is any great change, the adjustment period will be revised accordingly.

Table 10

Periodic Annual Net Growth and Annual Mortality

Average Per Acre By Type and Stand Size Class

| Major Sawtimber Types | Annual Net Growth Per Acre | | | Annual Mortality Per Acre | | | Area In Type Acres | Total Annual Net Growth | | | Total Annual Mortality | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Int. 1/4" B.F. | Scrib. Dec. C B.F. | Cubic Feet C.F. | Int. 1/4" B.F. | Scrib. Dec. C B.F. | Cubic Feet C.F. | | Int. 1/4" M B.F. | Scrib. Dec.C M B.F. | Cubic Feet M C.F. | Int. 1/4" M B.F. | Scrib. Dec. C M B.F. | Cubic Feet M C.F. |
| Sawtimber Types: | | | | | | | | | | | | | |
| Douglas-fir | 11.77 | 9.93 | 2.56 | 3.01 | 2.69 | .82 | 70,951 | 835 | 705 | 182 | 214 | 191 | 58 |
| Ponderosa Pine | 7.52 | 6.30 | 1.49 | 1.48 | 1.24 | .35 | 61,370 | 462 | 387 | 91 | 91 | 76 | 21 |
| Lodgepole Pine | 4.92 | 4.48 | 1.16 | 3.42 | 2.88 | .85 | 25,007 | 123 | 112 | 29 | 86 | 72 | 21 |
| White Fir | 4.44 | 3.56 | 1.19 | 3.10 | 2.64 | .69 | 1,734 | 8 | 6 | 2 | 5 | 5 | 1 |
| Spruce-Fir | 20.73 | 18.09 | 5.40 | 9.08 | 7.46 | 2.04 | 107,547 | 2,229 | 1,946 | 581 | 977 | 802 | 219 |
| Poletimber Types | | | | | | | | | | | | | |
| Lodgepole Pine | | | 1.78 | | | .80 | 71,650 | | | 128 | | | 57 |
| Aspen | | | 1.01 | | | .88 | 81,892 | | | 83 | | | 72 |
| Total | | | | | | | 420,151 | 3,657 | 3,156 | 1,096 | 1,373 | 1,146 | 449 |

## Calculation of the Allowable Cut

### Douglas-fir Sawtimber Type

There are 70,951 acres of sawtimber type which is 61 percent of the total Douglas-fir area. It is estimated that only 40 percent is operable, due largely to steep, rocky slopes and poor quality of the timber.

The average annual net growth is 9.93 board feet per acre in sawtimber size and 2.56 cubic feet for trees five inches d.b.h. and larger.

A 100-year adjustment period has been selected to convert the Douglas-fir sawtimber stands from a wild to a managed condition. As far as practicable, the oldest stands will be harvested first to minimize losses and to favor growth.

The allowable annual cut by area and volume is shown in Table 11. This was calculated using a tabulation method. Growth was calculated at midpoint of the period.

The annual allowable cut for the first 10-year period is:

| | |
|---|---|
| Area | 440 acres |
| Volume | 500 M Cubic Feet |

The cubic foot volume may be converted to board feet by using a converting factor of 2.74 for the Scribner Decimal C and 3.48 for International $\frac{1}{4}$" Log Scale. The volume converted to board feet (rounded off) is:

| | |
|---|---|
| Scribner Decimal C | 1,500 M B.F. |
| International $\frac{1}{4}$" | 1,700 M B.F. |

A comparison of the area by the tabulation method with other methods follows:

a. Straight area control is:

$$\frac{\text{Total acres Douglas-fir Type}}{\text{Rotation}} \quad \frac{116{,}000}{140} = 829 \text{ acres per year.}$$

b. The Kemp formula gives:

$$\frac{71{,}000 \times 7 + 45{,}000 \times 5 + 000 \times 3 + 000}{4 \times 140} = 1{,}289 \text{ acres per year.}$$

The volume to be cut is broken down into species as follows:

Based on Percentages as shown in Stock and Stand Table

| Species | Board Feet (Scribner Dec. C) |
|---|---|
| | M B.F. |
| Douglas-fir | 990 |
| Ponderosa Pine | 90 |
| Lodgepole Pine | 45 |
| White Fir | 150 |
| Engelmann Spruce | 195 |
| Blue Spruce | 30 |
| Total | 1,500 |

Ponderosa Pine Sawtimber Type

There are 61,000 acres of sawtimber type which is 74 percent of the total ponderosa pine area. It is estimated that only 80 percent is operable, due to steep, rocky slopes and isolated small patches of timber.

The average annual net growth is 6.30 board feet per acre in sawtimber size and 1.49 cubic feet for trees five inches and larger.

A 40-year adjustment period has been selected to convert the ponderosa pine stands from a wild to a managed condition. As far as practicable, the oldest stands will be harvested first to minimize losses and to favor growth.

The allowable cut by area and volume is shown in Table 11. This was calculated using a tabulation method. The acreage was adjusted to maintain an equal volume for each period.

The allowable cut per year for the first 10-year period is:

| | |
|---|---|
| Area | 1,260 acres |
| Volume | 700 M Cubic Feet |

The cubic foot volume allowable cut is converted to board feet by using a converting factor of 2.95 for the Scribner Decimal C and 3.74 for International $\frac{1}{4}$" Log Scale. These computed are:

Scribner Decimal C -- 700 x 2.95 = 2.0 MM B.F.

International $\frac{1}{4}$" -- 700 x 3.74 = 2.6 MM B.F.

A comparison of the area by the tabulation method with other methods follows:

a. Straight area control is:

$$\frac{\text{Total acres ponderosa pine type } 83{,}000}{\text{Rotation } 140} = 593 \text{ acres per year.}$$

417 acres x 1,720.46 = 0.7 MM B.F. per year.

b. The Kemp formula gives:

$$\frac{61{,}000 \times 7 + 22{,}000 \times 5 + 000 \times 3 + 000}{4 \times 140} = 959 \text{ acres per year.}$$

The volume to be cut is broken down into species as follows:

Based on Percentages as shown in Stock and Stand Table

| Species | Board Feet (Scribner Dec. C) |
|---|---|
| | M B.F. |
| Douglas-fir | 580 |
| Ponderosa Pine | 1,200 |
| Lodgepole Pine | 40 |
| White Fir | 120 |
| Blue Spruce | 60 |
| Total | 2,000 |

Lodgepole Pine Type

Considering the lack of growth, the lodgepole pine sawtimber and poletimber types will be regulated for cutting. Most of the poletimber type is now 80 to 100 years of age and it supports merchantable volumes of pulpwood. Since these stands grew under wild conditions, i.e., unmanaged, there should be no difficulty in producing a much greater volume per acre during the same length of period under good management.

The allowable cut is not shown separately for lodgepole pine poletimber and lodgepole pine sawtimber. The cubic foot allowable cut will be realistic only if a pulp mill is established in Colorado.

There are 25,000 acres of sawtimber type and 72,000 acres of poletimber type. The sawtimber acreage is 23 percent and the poletimber acreage is 60 percent of the total lodgepole pine type. It is estimated that only 70 percent of the lodgepole pine type is operable, due to steep, rocky slopes.

The average annual net growth is 4.48 board feet per acre in sawtimber and 1.16 cubic feet per acre for trees five inches d.b.h. and larger in the sawtimber type. It is 1.78 cubic feet per acre for the poletimber type.

A fifty-year adjustment period has been selected to convert the lodgepole pine sawtimber and poletimber stands from a wild to a managed condition. As far as practicable, the oldest stands will be harvested first to minimize losses and to favor growth.

The allowable annual cut by area and volume is shown in Table 11. This was calculated using a tabulation method. The acreage was adjusted to maintain an equal volume for each period.

The annual allowable cut per year for the first 10-year period is:

| | |
|---|---|
| Area | 1,360 acres |
| Volume | 2,200 M C.F. |

Thirty percent of the cubic foot volume may be converted to board feet for sawtimber by using the following factors:

Scribner Decimal C - 2.42
International $\frac{1}{4}$" - 3.05

The board feet yield would be --

$$(2{,}200 \text{ M C.F.} \times .30) \frac{\text{Scribner Decimal C}}{2.42} = 1.5 \text{ MM B.F.}$$

$$(2{,}200 \times .30) \frac{\text{International } \frac{1}{4}\text{"}}{3.05} = 2.0 \text{ MM B.F.}$$

A comparison of the area by the tabulation method with other methods follows:

a. Straight area control is:

$$\frac{\text{Total acres lodgepole type}}{\text{Rotation}} \quad \frac{110{,}000}{120} = 917 \text{ acres per year}$$

b. The Kemp formula gives:

$$\frac{25{,}000 \times 7 + 72{,}000 \times 5 + 13{,}000 \times 3}{4 \times 120} = 1{,}196 \text{ acres per year.}$$

The volume to be cut is broken down into species as follows:

| Species | Volume | |
|---|---|---|
| | Percent | M C.F. |
| Douglas-fir | 1 | 22 |
| Lodgepole Pine | 78 | 1,716 |
| Limber Pine | 1 | 22 |
| Subalpine Fir | 1 | 22 |
| Engelmann Spruce | 14 | 308 |
| Aspen | 5 | 110 |
| Total | 100 | 2,200 |

The Scribner Decimal C board foot volume by species for the sawtimber type is:

| Species | M B.F. |
|---|---|
| Douglas-fir | 18 |
| Lodgepole Pine | 1,039 |
| Limber Pine | 110 |
| Subalpine Fir | 12 |
| Engelmann Spruce | 321 |
| Total | 1,500 |

Spruce-Fir Sawtimber Type

There are 108,000 acres of sawtimber type which is 62 percent of the total spruce-fir area. It is estimated that only 60 percent is operable, due to excessive steep, rocky slopes.

The average annual net growth is 18.09 board feet per acre in sawtimber size and 5.40 cubic feet per acre for trees five inches d.b.h. and larger.

A 100-year adjustment period has been selected to convert the spruce-fir sawtimber stands from a wild to a managed condition. As far as practicable, the oldest stands will be harvested first to minimize losses and to favor growth.

The allowable annual cut by area and volume is shown in Table 11. This was calculated using a tabulation method. The acreage was adjusted to maintain an equal volume for each period.

The allowable cut per year for the first 10-year period is:

Area - 690 Acres Volume - 1,600 M Cubic Feet

The cubic foot volume allowable cut is converted to board feet by using a converting factor of 3.32 for the Scribner Decimal C and 4.05 for International $\frac{1}{4}$" Log Scale. These computed are:

Scribner Decimal C
1,600 x 3.32 = 5.0 MM B.F.

International $\frac{1}{4}$"
1,600 x 4.05 = 6.4 MM B.F

A comparison of the area by the tabulation method with other methods follows:

a. Straight area control is:

$$\frac{\text{Total acres Spruce-Fir type } 173,000}{\text{Rotation } 140} = 1,236 \text{ acres per year.}$$

b. The Kemp formula gives:

$$\frac{108,000 \times 7 + 53,000 \times 5 + 2,000 \times 3 + 10,000}{4 \times 140} = 1,851 \text{ acres per year.}$$

The volume to be cut is broken down into species as follows:

Based on the Percentages in the Stock and Stand Table

| Species | M B.F. |
|---|---|
| Douglas-fir | 50 |
| Lodgepole Pine | 100 |
| Subalpine Fir | 350 |
| Engelmann Spruce | 4,500 |
| Total | 5,000 |

Allowable Cut Beyond the Adjustment Period

There should be very little reduction in the volume allowable cut after the adjustment periods in any of the types. There will be a gradual conversion of the aspen back to a coniferous type; this will mean an increased acreage of conifers. Growth will be improved; this will mean an increased volume per acre. Some areas now considered inoperable because of small volumes and high access costs will become operable; this will increase the acreage of merchantable timber.

It is estimated that the distribution of stand size classes, without regard to operability, at the end of the adjustment period will be as follows:

| Stand Size Class | Type: Ponderosa Pine Acres | Douglas-fir Acres | Lodgepole Pine Acres | Spruce-Fir Acres |
|---|---|---|---|---|
| Sawtimber | 30,000 | 50,000 | 20,000 | 60,000 |
| Poletimber | 18,000 | 33,000 | 42,000 | 50,000 |
| Seedling-Sapling | 35,000 | 26,000 | 45,000 | 150,000 |
| Nonstocked | 2,000 | 2,000 | 3,000 | 10,000 |
| Total | 85,000 | 115,000 | 110,000 | 270,000 |

The Kemp formula, using the above data, gives an allowable cut of 1,198 acres for the Douglas-fir, 848 acres for ponderosa pine, 1,017 acres for lodgepole pine, and 2,018 acres for Engelmann spruce. This is a total of 5,081 acres as compared with the current 3,750 acres allowable cut. If the current operability factors are applied, the acreage would be similar.

The current allowable cuts provide for obtaining an acceptable distribution of age classes by the beginning of the second rotation period.

## Volume in Unregulated Types

### Aspen

There are 106,000 acres typed as aspen. 82,000 acres are of poletimber size or larger whose average volume per acre is 1,089.26 cubic feet. The total volume is 90,200 M C.F. At the present time there is no market for this species and none is expected to develop during the next 10 years.

## Cutting Budget

The cutting budget for this period is shown in Table 12. Selection of compartments in which cutting is scheduled was based on the age and condition of the sawtimber stands. The areas are distributed over the working circle and are within reasonable hauling distances of community centers that either support or could support a sawmill industry. The schedule will permit an orderly harvesting of the working circle.

A cutting budget will not be set up for pulpwood until a demand has been developed for the product. The cutting budget will be coordinated with the needs of the industry and with adjacent working circles.

Table 11

Periodic Allowable Cut
By Area and Yield in Cubic Feet
For the Next 40 Years

| 10-Year Periods | Type | Area Allowable Cut Acres | Yield: Volume Per Acre: Beginning of Period C.F | Net Growth C.F. | Total C.F. | Total Volume MM C.F. |
|---|---|---|---|---|---|---|
| 1st | Douglas-fir | 4,400 | 1,162 | 13 | 1,175 | 5 |
| | Ponderosa Pine | 12,600 | 530 | 7 | 537 | 7 |
| | Lodgepole Pine | 13,600 | 1,610 | 8 | 1,618 | 22 |
| | Spruce-Fir | 6,900 | 2,319 | 27 | 2,346 | 16 |
| 2nd | Douglas-fir | 4,300 | 1,188 | 13 | 1,201 | 5 |
| | Ponderosa Pine | 12,300 | 545 | 7 | 552 | 7 |
| | Lodgepole Pine | 13,500 | 1,626 | 8 | 1,634 | 22 |
| | Spruce-Fir | 6,700 | 2,373 | 27 | 2,400 | 16 |
| 3rd | Douglas-fir | 4,200 | 1,214 | 13 | 1,227 | 5 |
| | Ponderosa Pine | 12,000 | 560 | 7 | 567 | 7 |
| | Lodgepole Pine | 13,400 | 1,642 | 8 | 1,650 | 22 |
| | Spruce-Fir | 6,500 | 2,427 | 27 | 2,454 | 16 |
| 4th | Douglas-fir | 4,100 | 1,240 | 13 | 1,253 | 5 |
| | Ponderosa Pine | 11,800 | 575 | 7 | 582 | 7 |
| | Lodgepole Pine | 13,300 | 1,658 | 8 | 1,666 | 22 |
| | Spruce-Fir | 6,400 | 2,481 | 27 | 2,508 | 16 |

Total Area

| | |
|---|---|
| Douglas-fir | 17,000 Acres |
| Ponderosa Pine | 48,700 |
| Lodgepole Pine | 53,800 |
| Spruce-Fir | 26,500 |

## Table 12

Cutting Budget F.Y. 1963-1972

| Compartment No. | Name | Ranger District | Gross Sawtimber Area in Compartment | Douglas-fir Sawtimber Type | | Ponderosa Pine Sawtimber Type | | Lodgepole Pine Sawtimber Type | | Spruce-Fir Sawtimber Type | | Total Volume MM B.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Net Area Acres | Volume MM B.F. | Net Area Acres | Volume MM B.F. | Net Area Acres | Volume MM B.F. | Net Area Acres | Volume MM B.F. | |
| Timber Under Contract But Uncut As Of December 31, 1961 | | | | | | | | | | | | 10 |
| 035 | Greenhorn | San Carlos | 26,004 | 3,000 | 11 | 500 | 1 | 150 | 1 | 7,000 | 55 | 68 |
| 037 | Williams Creek | Sp. Peaks | 9,695 | | | | | | | 3,000 | 23 | 23 |
| 038 | Black Mountain | Sp. Peaks | 4,955 | | | 4,900 | 9 | | | | | 9 |
| 040 | Cucharus | Sp. Peaks | 4,909 | 400 | 1 | | | | | 500 | 4 | 5 |
| 019 | So.Fork Arkansas | Salida | 5,483 | | | | | | | 100 | 1 | 1 |
| 006 | Lake Creek | Leadville | 9,195 | | | | | 100 | 1 | 1,000 | 8 | 9 |
| 010 | Middle Cottonwood | Salida | 7,375 | | | | | | | 1,000 | 8 | 8 |
| 033 | Newlin | San Carlos | 11,695 | 1,000 | 4 | 500 | 1 | | | | | 5 |
| 034 | Beulah | San Carlos | 21,465 | 2,000 | 7 | 2,000 | 4 | | | | | 11 |
| 030 | Muddy | Sp. Peaks | 5,260 | 400 | 1 | 2,000 | 4 | | | 200 | 2 | 7 |
| 008 | Pine Creek | Leadville | 5,560 | | | 1,000 | 2 | 1,200 | 5 | 500 | 4 | 11 |
| 002 | Turquoise | Leadville | 6,595 | | | | | 600 | 3 | 500 | 4 | 7 |
| 003 | Halfmoon | Leadville | 6,565 | | | | | 1,200 | 5 | 1,000 | 8 | 13 |
| 023 | Poncha | Salida | 10,458 | 1,000 | 4 | | | 800 | 4 | 200 | 2 | 10 |
| 027 | Brush | San Carlos | 6,440 | | | 500 | 1 | | | | | 1 |
| 028 | Alvarado | San Carlos | 4,775 | | | | | 500 | 2 | | | 2 |
| 039 | Indian | Sp. Peaks | 3,032 | | | 500 | 1 | | | | | 1 |
| Total | | | 149,461 | 7,800 | 28 | 11,900 | 23 | 4,550 | 21 | 15,000 | 119 | 201 |

## TRANSPORTATION

Table 13 shows the road survey and construction program necessary to harvest the timber listed in the 10-year cutting budget.

Timber purchaser construction or a combination of purchaser and Forest Service construction will be required for the larger offerings. This is necessary since government funds have never been adequate for the construction of all timber access roads.

All roads listed in Table 13 are primarily for the purpose of timber access. Where heavy all-purpose use of the road is anticipated, the Forest Service will finance from all-purpose funds standards above that required to remove the timber.

### Right-of-Way Needs

Rights-of-way will be obtained sufficiently in advance of road construction to avoid delays in construction. Table 14 lists the rights-of-way needed and scheduling necessary to meet the cutting budget.

## Table 13

Timber Access Road Development Program F.Y. 1963-1972

| Compartment Name | No. | Road Name | Road No. | Class | Constructed By | Est. Miles | Est.* Cost Per Mile | Total Cost* | Date Survey Required | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Williams Creek | 037 | Greenhorn Mtn. | 2362 | SN | Contract | 11 | 11,000 | 121,000 | 1962 | Sell F.Y. 1962 |
| Greenhorn | 035 | Greenhorn Mtn. | 2362 | SN | Contract | 3 | 11,000 | 33,000 | 1962 | Sell F.Y. 1962 |
| | | Elmer Canyon | 55206 | SL | Purchaser | 5 | 5,000 | 25,000 | 1962 | Sell F.Y. 1963 |
| | | Mammoth Gulch | 55211 | SN | Contract | 14 | 15,000 | 210,000 | 1965 | Sell F.Y. 1966 |
| | | Little St. Chas. | 2357 | SN | Contract | 7 | 17,000 | 119,000 | 1966 | Sell F.Y. 1968 |
| Black Mountain | 038 | Cottonwood Creek | 2364 | SN | Purchaser | 5 | 12,000 | 60,000 | 1963 | Sell F.Y. 1965 |
| | | Black Mountain | 2365 | SN | Purchaser | 9 | 12,000 | 108,000 | 1963 | Sell F.Y. 1965 |
| Cuchara | 040 | Texas Creek | 2378 | SN | Purchaser | 2 | 13,000 | 26,000 | 1963 | Sell F.Y. 1964 |
| | | North Fork | 2374 | SN | Purchaser | 8 | 13,000 | 104,000 | 1963 | Sell F.Y. 1964 |
| Lake Creek | 006 | Graham Gulch | 2224 | SN | Purchaser | 8 | 15,000 | 120,000 | 1962 | Sell F.Y. 1963 |
| | | Spout Lake | 2253 | SN | Purchaser | 2 | 12,000 | 24,000 | 1963 | Sell F.Y. 1964 |
| | | Gladstone | 55101 | SN | Purchaser | 3 | 6,000 | 18,000 | 1965 | Sell F.Y. 1965 |
| Newlin | 033 | Oak Creek | 2340 | SN | Purchaser | 2 | 12,000 | 24,000 | 1963 | Sell F.Y. 1964 |
| | | Hiline | 2341 | SN | Purchaser | 6 | 13,000 | 78,000 | 1963 | Sell F.Y. 1964 |
| | | Ilse | 2342 | SN | Purchaser | 3 | 13,000 | 39,000 | 1963 | Sell F.Y. 1964 |
| Muddy | 030 | Medano | 2367 | SN | Contract | 7 | 16,000 | 112,000 | 1966 | Sell F.Y. 1967 |
| | | Range | 55188 | SN | Purchaser | 4 | 6,000 | 24,000 | 1966 | Sell F.Y. 1967 |
| Pine Creek | 008 | Wapaca | 2233 | SN | Purchaser | 6 | 17,000 | 102,000 | 1967 | Sell F.Y. 1968 |
| Turquoise | 002 | Porcupine | 2205 | SN | Purchaser | 6 | 16,000 | 96,000 | 1967 | Sell F.Y. 1968 |
| | | Lake Fork | 2210 | SN | Purchaser | 4 | 16,000 | 64,000 | 1968 | Sell F.Y. 1969 |
| Halfmoon | 003 | Rock Creek | 2212 | SN | Contract | 10 | 17,000 | 170,000 | 1966 | Sell F.Y. 1967 |
| Poncha | 023 | Starvation | 2322 | SN | Contract | 10 | 18,000 | 180,000 | 1968 | Sell F.Y. 1969 |
| Brush | 027 | Rainbow | 2332 | SN | Contract | 5 | 14,000 | 70,000 | 1966 | Sell F.Y. 1967 |
| Alvarado | 028 | Rainbow | 2332 | SN | Contract | 5 | 14,000 | 70,000 | 1967 | Sell F.Y. 1968 |
| Indian | 039 | Indian Creek | 2372 | SN | Purchaser | 4 | 13,000 | 52,000 | 1968 | Sell F.Y. 1969 |

*Estimated cost is to build road to an all-purpose standard.

Table 14

Timber Access Right-of-Way Needs

| Compartment Name | Compartment No. | Road Name | Road No. | No. Easements | Volume MM B.F. | Year Needed |
|---|---|---|---|---|---|---|
| Black Mountain | 038 | Cottonwood Creek | 2364 | 1 | 5 | 1963 |
| | | Black Mountain | 2365 | 1 | 4 | 1963 |
| Newlin | 033 | Hiline | 2341 | 1 | 4 | 1963 |
| | | Ilse | 2342 | 1 | 4 | 1963 |
| Muddy | 030 | Medano | 2367 | 1 | 7 | 1966 |
| Pine Creek | 008 | Wapaca | 2233 | 1 | 11 | 1967 |
| Halfmoon | 003 | Rock Creek | 2212 | 1 | 13 | 1966 |
| Brush | 027 | Rainbow | 2332 | 2 | 1 | 1966 |
| Alvarado | 028 | Rainbow | 2332 | 2 | 2 | 1967 |

## SALES POLICY

The small stands of timber and the very broken terrain separating these stands preclude the offering of sales exceeding five million board feet in size on the forest except in the Greenhorn-Williams Creek area. For this reason most sawtimber offerings will average two to five million board feet. This size of sale will be ample to permit the average existing mill and the average proposed operation to maintain a three to five-year supply of wood. A few sales in the Greenhorn-Williams Creek area will be larger, though they will not exceed 15 million board feet.

New sawmills are needed adjacent to the forest. The present industry is not large enough to process the allowable cut. A pulp mill will also be needed in Colorado if the lodgepole pine poletimber cut is to reach its allowable size.

### Points of Manufacture

Timber on any part of the forest will be appraised to the logical town along the Denver and Rio Grande Western Railroad. The entire forest is very well served by this railroad.

### Merchantability Specifications

The minimum size sawtimber tree in lodgepole pine is 10" d.b.h. and to a six-inch top d.i.b. For all other species the minimum size tree is 10" d.b.h. to an eight-inch top d.i.b. Maximum stump height for all species is 12 inches.

For pulpwood, the minimum size for all species except dead spruce is five-inch d.b.h. and to a four-inch d.i.b. The tree must have at least one eight-foot pulpwood stick that is reasonably straight. Maximum stump height is eight inches.

### Logging Methods

Presale prescriptions will specify the method of logging that will be permissible for each sale. The use of tractor and animal skidding is acceptable. Jammer or cable skidding is acceptable for clear-cut areas.

Special consideration will be given to Engelmann spruce slash disposal due to the potential hazard from bark beetles. Complete slash disposal, entire tree skidding with slash and cull disposal at the landing, or other similar methods, will be prescribed for spruce sales.

Considering the importance of other uses in the working circle, a good logging and clean-up job will be required. Cutover areas will be left in a condition that will not materially curtail other approved uses of the land.

## TIMBER STAND IMPROVEMENT

### Reforestation

The recent forest inventory classified certain timber types as poorly stocked and nonstocked, Table 4. These areas will be examined on the ground to determine if they are not adequately stocked with seedlings. The stand condition description in the compartment records will define areas in need of reforestation. The compartment records are scheduled for completion within one year after the approval of this plan.

The expected planting job for the next two decades is shown in Table 15. The scheduling of the program is set up in the forest planting plan.

### Seed Orchard Establishment

To insure an adequate supply of seed and planting stock of reliable viability and genetic quality, an area of 200 acres will be reserved for seed production. This project will be initiated in 1962 to assure planting stock in three years.

### Measures to Aid or Control Natural Regeneration

In the spruce-fir, Douglas-fir and ponderosa pine types, logging and slash disposal methods will be used which will result in an improved seed bed.

In the lodgepole pine type, the method of logging and slash disposal will be varied as necessary to aid in controlling the amount and distribution of reproduction.

### Thinning

1. Noncommercial

   Noncommercial thinning in the lodgepole pine type will be done on all overstocked areas of noncommercial-size trees where site quality and age indicate that satisfactory response may be expected. Noncommercial thinnings will not be made in stands over 70 years of age. Additional areas needing noncommercial thinning are anticipated from 13,000 acres to be clear cut in this period. This will be done by sale area betterment funds. Noncommercial thinning will not be required in the spruce-fir type.

2. Commercial Thinning

Commercial thinning, i.e., intermediate cuts, will be done on some 500 acres of lodgepole pine poletimber to supply the post and pole market.

Intermediate cuts will normally be limited to those commercial size stands that had received a noncommercial thinning prior to the time that the stand had reached 70 years of age.

Table 15

The Planting Job - 1962 to 1972

| Type | Nonstocked (Acres) | Understocked Seedling-Sapling Stands (Acres) | Poletimber Size Stands to be Clear Cut (Acres) | Planting Needed to Re-establish Conifers in Aspen Type (Acres) | Planting Needed on Sawtimber Areas to be Cut Over After 1961 (Acres) | Total |
|---|---|---|---|---|---|---|
| Douglas-fir | | | | | 2,000 | 2,000 |
| Ponderosa Pine | | 100 | | | 3,000 | 3,100 |
| Lodgepole Pine | 100 | 100 | 3,000 | | | 3,200 |
| Spruce-Fir | 3,000 | 200 | | 5,000 | 10,000 | 18,200 |
| Total | 3,100 | 400 | 3,000 | 5,000 | 15,000 | 26,500 |

The Planting Job - 1962 to 1982

| Type | Nonstocked (Acres) | Understocked Seedling-Sapling Stands (Acres) | Poletimber Size Stands to be Clear Cut (Acres) | Planting Needed to Re-establish Conifers in Aspen Type (Acres) | Planting Needed on Sawtimber Areas to be Cut Over After 1961 (Acres) | Total |
|---|---|---|---|---|---|---|
| Douglas-fir | | | | | 4,000 | 4,000 |
| Ponderosa Pine | | 200 | | | 6,000 | 6,200 |
| Lodgepole Pine | 100 | 200 | 6,000 | | | 6,300 |
| Spruce-Fir | 6,000 | 400 | | 20,000 | 27,100 | 53,500 |
| Total | 6,100 | 800 | 6,000 | 20,000 | 37,100 | 70,000 |

## PROTECTION

### Insects

#### Insect Conditions

The presence of the spruce bark beetle has been noticeable throughout the spruce type but has never been epidemic until 1960 when several outbreaks were found in the leave strips of logged areas. Special measures have been initiated to control the outbreak.

The Black Hills beetle is always present and occasionally an attack will reach epidemic proportions. Small control jobs and timber sales have in the past kept this insect in bounds.

A serious epidemic of the spruce budworm covers most of the Douglas-fir type. Some type of control will be necessary if the damage increases much more.

We have had no trouble with the bark beetles in the lodgepole pine type. No special control measures have been necessary.

The Great Basin Tent Caterpillar infestation died out in 1959 with no control work done.

#### Action Program

Sixty-two percent of the spruce-fir type is of sawtimber size. Most of this is past rotation age and is considered a high bark beetle risk. A considerable portion of the type has no access roads, making detection and maintenance control costly. Key timber-purchaser constructed roads in the spruce type will be kept on the road system for potential insect detection and control needs.

##### Ponderosa Pine, Douglas-fir, and Lodgepole Pine Types

A continuing carefully administered protection program will be maintained so that potential epidemics can be recognized and controlled.

### Spruce-Fir Type

Logging slash and cull logs that would harbor spruce bark beetles will be bunched and burned before the emergence of the beetles. This will be done by tree-length skidding or any other method that will bunch the material for burning. New timber sale contracts will provide for the slash and cull log treatment described. Also, extended contracts and those that provide for rate redetermination will be modified to require this type of insect control.

## Disease

### Disease Conditions

Most of the ponderosa pine type is infested with dwarfmistletoe (Arceuthobium vaginatum forma crystopodum) and about one-half of the lodgepole pine is infested with dwarfmistletoe (Arceuthobium americanum). Control measures in each case consist of the removal of infested trees by commercial sales and by girdling, poisoning or pushing over the residual stand.

### Action Program

#### Lodgepole Pine Types

On all sales where K-V funds are collected, the treatment will be:

Where the residual stand is less than five cords per acre, and no market exists or is foreseen in the near future, the trees will be destroyed.

Where the residual stand is over five cords per acre, no control work will be undertaken except with the approval of the forest supervisor.

In poletimber-sized stands, control will be by commercial sales as for pulpwood.

#### Ponderosa Pine Type

On all sales where K-V funds were collected, the treatment will be:

Removal of all infected trees either by girdling, poisoning or pushing over, except in those individual cases where pruning will remove the infection.

Animals

Livestock

All plantations will be fenced, if necessary, to protect the trees from livestock. The fences will be maintained until the trees are above browse height. Areas to be regenerated by natural means may be fenced, if necessary, to protect the reproduction from animal damage.

Wildlife

Plantations will not be established on heavily used winter game range.

Porcupines

All users of the forest will be encouraged to kill porcupines. When necessary, employees will be furnished small bore ammunition for porcupine control.

Other Rodents

Control measures will be taken when necessary to prevent rodent damage to plantations.

Fire

Provision is made in current sales for reduction of slash or for extra protection for slash areas until the hazard has been abated naturally.

Protection Program

A slash disposal plan will be prepared for each sale area in accordance with instructions in FSH 5100.

The forest will maintain the necessary equipment and protection organization adequate to keep commercial timberland fires within the annual "PAR" in the fire prevention plan. The equipment and organization necessary will be specified in the presuppression plan.

## SUPPORTING DATA

### Compartment Records

Within one year after the approval of this plan, a system of compartment records will be set up for each ranger district. This will consist of Form R2-2400-19 and a map maintained in an atlas-size binder for each compartment within the ranger district. The R2-2400-19 will be posted annually. Since balances may be struck at any time, the form provides for a continuous inventory of the compartment. Compartment descriptions for at least those compartments scheduled for cutting during the 10-year period will also be included in the atlas binder. Such descriptions may be made on the back of R2-2400-19. Detailed instructions are in the compartment binder.

### Timber Inventory

This plan revision is based on inventory data obtained from the cooperative Forest Survey - Region 2 Inventory Program conducted during 1957-1961.

The inventory was conducted to standards prescribed and agreed to by Forest Survey of the Intermountain Forest and Range Experiment Station, and the Division of Timber Management of Region 2 (reference, Field Instructions for Forest Inventory, Rocky Mountain Region, 1956). Forest Survey read the plots and processed the data; Region 2 delineated the types on aerial photographs, transferred the types to planimetric maps, printed the final type maps and calculated the area of the types.

### Sampling Error

Volume data was based on plots taken at 198 locations. Two plots were taken at each location. Table 30 shows the number of locations for each volume stratum. It was estimated that the 198 locations would give a sampling error for the total cubic foot volume of not to exceed five percent (one standard error) for the working circle.

There is no sampling error in the area determination since the calculations were based on a 100 percent typing job.

### Data Processing

Forest Survey of the Intermountain Forest and Range Experiment Station processed the data through the ADP Section of the Pacific Southwest Station. This was done in accordance with the "Plan for Compilation of the Intermountain Forest Survey, Rocky Mountain Area, by IBM Method," October 1, 1956, by Robert M. Miller.

The following NFA tables are on file in the supervisor's office at Pueblo, Colorado:

Area

NFA 2 - Compartment Area
NFA 3 - Block Area Summary
NFA 4 - Working Circle Area Summary

Volume

NFA 6 - Total average net volume per acre by merchantability class, volume stratum, species and 10" d.b.h. class.

NFA 7 - Total average net volume per acre by merchantability class, volume stratum, species and 2" d.b.h. class.

NFA 31- Adjusted 10-year gross growth and 10-year mortality volume per acre by growing stock.

Miscellaneous Tables - Number of trees per acre and various Forest Survey summaries.

Copies of the plot tally sheets are on file in the forest supervisor's office.

Aerial photographs on which the photo interpretation was done are on file at the Denver Federal Record Center.

Type map plates are stored in the Division of Timber Management, Forest Service, Denver, Colorado.

Method for Calculating Periodic Annual Net Growth

NFA Table No. 31 in the IBM binder gives the average adjusted 10-year growth increment and the 10-year mortality by growth stratums, species, and 2" d.b.h. classes. The volumes are shown in both board feet and cubic feet.

The growth stratum codes are as follows:

GS-01 = All conifer sawtimber stands.
GS-02 = All conifer poletimber stands.
GS-03 = All conifer seedlings and saplings and nonstocked stands.
GS-04 = All hardwood stands.

The gross 10-year growth is based upon merchantability class (MC-1) trees. These are all live, merchantable trees. Mortality is shown under merchantability class (MC-7) trees. These are all mortality trees. The Forest Survey crews estimated the trees that died during the past five years. This volume was then doubled to put it on the same period as the growth. The growth was based on the past 10 years.

The periodic annual net growth per acre can be determined for any given species and d.b.h. class within a growth stratum, or the total of all species in d.b.h. classes within a growth stratum, by subtracting the volume shown for the average 10-year mortality (MC-7) from the average 10-year growth increment (MC-1) and dividing by 10.

Growth stratums do not correspond to volume stratums. The total volume of timber in the working circle and the allowable cuts are based upon volume stratums. It was, therefore, necessary to construct a growth and mortality table for the volume stratums using the data given in NFA Table 31. This was done by weighting the growth and mortality of the species in the growth stratums by the percent of each species in the volume stratums.

Table 16

Distribution of Site Trees
By Major Types, Age Classes, Stand Size Classes, Stocking Classes

| Major Types | Age Groups | Sawtimber | | | | | | Poletimber | | | | | | Seedling-Sapling | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Trees | | | Percent | | | Trees | | | Percent | | | Trees | | | Percent | | |
| | | W | M | P | W | M | P | W | M | P | W | M | P | W | M | P | W | M | P |
| Douglas-fir | 1- 19 | | | | | | | | | | | | | | | | | | |
| | 20- 39 | | | | | | | | | | | | | | | | | | |
| | 40- 59 | | | 1 | | | 1.9 | 1 | 2 | | 10.0 | 20.0 | | | | | | | |
| | 60- 79 | | | 10 | | | 19.2 | 2 | 1 | 1 | 20.0 | 10.0 | 50.0 | | | | | | |
| | 80- 99 | | 5 | 13 | | 17.9 | 25.0 | 4 | 2 | | 40.0 | 20.0 | | | | | | | |
| | 100-119 | | 1 | 9 | | 3.6 | 17.3 | 2 | 1 | 1 | 20.0 | 10.0 | 50.0 | | | | | | |
| | 120-139 | | 6 | 3 | | 21.4 | 5.8 | | 3 | | | 30.0 | | | | | | | |
| | 140-159 | | 6 | 4 | | 21.4 | 7.7 | 1 | 1 | | 10.0 | 10.0 | | | | | | | |
| | 160+ | | 10 | 12 | | 35.7 | 23.1 | | | | | | | | | | | | |
| | Total | | 28 | 52 | | 100 | 100 | 10 | 10 | 2 | 100 | 100 | 100 | | | | | | |
| Ponderosa Pine | 1- 19 | | | | | | | | | | | | | | | | | | |
| | 20- 39 | | | | | | | | | | | | | | | | | | |
| | 40- 59 | | | 1 | | | 2.4 | | 1 | 1 | | 50.0 | 16.7 | | | | | | |
| | 60- 79 | | 2 | 4 | | 50.0 | 9.8 | | 1 | | | 50.0 | | | | | | | |
| | 80- 99 | | | 10 | | | 24.4 | | | 2 | | | 33.2 | | | | | | |
| | 100-119 | | | 5 | | | 12.2 | | | 1 | | | 16.7 | | | | | | |
| | 120-139 | | 2 | 7 | | 50.0 | 17.1 | | | 1 | | | 16.7 | | | | | | |
| | 140-159 | | | 3 | | | 7.3 | | | 1 | | | 16.7 | | | | | | |
| | 160+ | | | 11 | | | 26.8 | | | | | | | | | | | | |
| | Total | | 4 | 41 | | 100 | 100 | | 2 | 6 | | 100 | 100 | | | | | | |

(Table Continued)

Table 16 (Continued)

Distribution of Site Trees
By Major Types, Age Classes, Stand Size Classes, Stocking Classes

| Major Types | Age Groups | Sawtimber Trees W | Sawtimber Trees M | Sawtimber Trees P | Sawtimber Percent W | Sawtimber Percent M | Sawtimber Percent P | Poletimber Trees W | Poletimber Trees M | Poletimber Trees P | Poletimber Percent W | Poletimber Percent M | Poletimber Percent P | Seedling-Sapling Trees W | Seedling-Sapling Trees M | Seedling-Sapling Trees P | Seedling-Sapling Percent W | Seedling-Sapling Percent M | Seedling-Sapling Percent P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lodgepole Pine | 1- 19 | | | | | | | | | | | | | | | | | | |
| | 20- 39 | | | | | | | | | | | | | | | | | | |
| | 40- 59 | | | 4 | | | 28.6 | | 2 | | | 7.1 | | | 1 | | | 50.0 | |
| | 60- 79 | | | 1 | | | 7.1 | 3 | 6 | | 18.7 | 21.4 | | 1 | 1 | | 33.3 | 50.0 | |
| | 80- 99 | | | 2 | | | 14.3 | 5 | 9 | | 31.3 | 32.2 | | 1 | | | 33.3 | | |
| | 100-119 | | | 1 | | | 7.1 | 3 | 3 | | 18.7 | 10.7 | | 1 | | | 33.3 | | |
| | 120-139 | | | 2 | | | 14.3 | 2 | 7 | | 12.5 | 25.0 | | | | | | | |
| | 140-159 | | 1 | | | 16.7 | | 2 | | | 12.5 | | | | | | | | |
| | 160+ | | 5 | 4 | | 83.3 | 28.6 | 1 | 1 | | 6.3 | 3.6 | | | | | | | |
| | Total | | 6 | 14 | | 100 | 100 | 16 | 28 | | 100 | 100 | | 3 | 2 | | 100 | 100 | |
| Engelmann Spruce | 1- 19 | | | | | | | | | | | | | | | | | | |
| | 20- 39 | | | | | | | | | 1 | | | 20.0 | | | | | | |
| | 40- 59 | | 2 | 3 | | 4.5 | 7.5 | | 1 | 3 | | 16.7 | 60.0 | | | | | | |
| | 60- 79 | | | 7 | | | 17.5 | | 5 | | | 83.3 | | | | | | | |
| | 80- 99 | | 2 | 7 | | 4.5 | 17.5 | | | 1 | | | 20.0 | | | | | | |
| | 100-119 | | 4 | 5 | | 9.1 | 12.5 | | | | | | | | | | | | |
| | 120-139 | | 3 | 5 | | 6.9 | 12.5 | | | | | | | | | | | | |
| | 140-159 | 1 | 2 | 1 | 16.7 | 4.5 | 2.5 | | | | | | | | | | | | |
| | 160+ | 5 | 31 | 12 | 83.3 | 70.5 | 30.0 | | | | | | | | | | | | |
| | Total | 6 | 44 | 40 | 100 | 100 | 100 | | 6 | 5 | | 100 | 100 | | | | | | |

W, M, and P refer to well, medium and poor stocking classes.

Table 17

Estimated Area By Age Classes 40 Years and Older for Major Types

| Type and Stocking Class | Total Acres | Age Class 40 Percent | Age Class 40 Acres | Age Class 60 Percent | Age Class 60 Acres | Age Class 80 Percent | Age Class 80 Acres | Age Class 100 Percent | Age Class 100 Acres | Age Class 120 Percent | Age Class 120 Acres | Age Class 140 Percent | Age Class 140 Acres | Age Class 160+ Percent | Age Class 160+ Acres | Total Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Douglas-fir Sawtimber | | | | | | | | | | | | | | | | |
| Well Stocked | 220 | | | | | | | | | | | | | 100.0 | 220 | 100.0 |
| Medium Stocked | 26,796 | | | | | 17.9 | 4,796 | 3.6 | 966 | 21.4 | 5,734 | 21.4 | 5,734 | 35.7 | 9,566 | 100.0 |
| Poorly Stocked | 43,935 | 1.9 | 835 | 19.2 | 8,435 | 25.0 | 10,984 | 17.3 | 7,601 | 5.8 | 2,548 | 7.7 | 3,383 | 23.1 | 10,148 | 100.0 |
| Total | 70,951 | 1.2 | 835 | 11.9 | 8,435 | 22.2 | 15,780 | 12.1 | 8,567 | 11.7 | 8,282 | 12.8 | 9,117 | 28.1 | 19,934 | 100.0 |
| Douglas-fir Poletimber | | | | | | | | | | | | | | | | |
| Well Stocked | 23,571 | 10.0 | 2,357 | 20.0 | 4,714 | 40.0 | 9,429 | 20.0 | 4,714 | | | 10.0 | 2,357 | | | 100.0 |
| Medium Stocked | 18,945 | 20.0 | 3,789 | 10.0 | 1,895 | 20.0 | 3,789 | 10.0 | 1,895 | 30.0 | 5,682 | 10.0 | 1,895 | | | 100.0 |
| Poorly Stocked | 1,979 | | | 50.0 | 989 | | | 50.0 | 990 | | | | | | | 100.0 |
| Total | 44,495 | 13.8 | 6,146 | 17.1 | 7,598 | 29.6 | 13,218 | 17.1 | 7,599 | 12.8 | 5,682 | 9.6 | 4,252 | | | 100.0 |
| Ponderosa Pine Sawtimber | | | | | | | | | | | | | | | | |
| Well Stocked | -- | | | | | | | | | | | | | | | |
| Medium Stocked | 9,193 | | | 50.0 | 4,596 | | | | | 50.0 | 4,597 | | | | | 100.0 |
| Poorly Stocked | 52,177 | 2.4 | 1,252 | 9.8 | 5,113 | 24.4 | 12,731 | 12.2 | 6,365 | 17.1 | 8,922 | 7.3 | 3,809 | 26.8 | 13,983 | 100.0 |
| Total | 61,370 | 2.0 | 1,252 | 15.8 | 9,709 | 20.8 | 12,731 | 10.4 | 6,365 | 22.0 | 13,519 | 6.2 | 3,809 | 22.8 | 13,983 | 100.0 |
| Ponderosa Pine Poletimber | | | | | | | | | | | | | | | | |
| All Classes | 21,792 | 25.0 | 5,448 | 12.5 | 2,724 | 25.0 | 5,448 | 12.5 | 2,724 | 12.5 | 2,724 | 12.5 | 2,724 | | | 100.0 |
| Total | 21,792 | 25.0 | 5,448 | 12.5 | 2,724 | 25.0 | 5,448 | 12.5 | 2,724 | 12.5 | 2,724 | 12.5 | 2,724 | | | 100.0 |

(Table Continued)

Table 17 (Continued)

Estimated Area By Age Classes 40 Years and Older for Major Types

| Type and Stocking Class | Total Acres | Age Class 40 Percent | Age Class 40 Acres | Age Class 60 Percent | Age Class 60 Acres | Age Class 80 Percent | Age Class 80 Acres | Age Class 100 Percent | Age Class 100 Acres | Age Class 120 Percent | Age Class 120 Acres | Age Class 140 Percent | Age Class 140 Acres | Age Class 160+ Percent | Age Class 160+ Acres | Total Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lodgepole Pine Sawtimber | | | | | | | | | | | | | | | | |
| Well Stocked | 160 | | | | | | | | | | | | | 100.0 | 160 | 100.0 |
| Medium Stocked | 9,407 | | | | | | | | | | | 16.7 | 1,571 | 83.3 | 7,836 | 100.0 |
| Poorly Stocked | 15,440 | 28.6 | 4,416 | 7.1 | 1,096 | 14.3 | 2,208 | 7.1 | 1,096 | 14.3 | 2,208 | | | 28.6 | 4,416 | 100.0 |
| Total | 25,007 | 17.7 | 4,416 | 4.4 | 1,096 | 8.8 | 2,208 | 4.4 | 1,096 | 8.8 | 2,208 | 6.3 | 1,571 | 49.6 | 12,412 | 100.0 |
| Lodgepole Pine Poletimber | | | | | | | | | | | | | | | | |
| Well Stocked | 36,341 | | | 18.7 | 6,796 | 31.3 | 11,374 | 18.7 | 6,796 | 12.5 | 4,543 | 12.5 | 4,543 | 6.3 | 2,289 | 100.0 |
| Med.& Poorly Stocked | 35,309 | 7.1 | 2,507 | 21.4 | 7,557 | 32.2 | 11,369 | 10.7 | 3,778 | 25.0 | 8,827 | | | 3.6 | 1,271 | 100.0 |
| Total | 71,650 | 3.5 | 2,507 | 20.0 | 14,353 | 31.7 | 22,743 | 14.8 | 10,574 | 18.7 | 13,370 | 6.3 | 4,543 | 5.0 | 3,560 | 100.0 |
| Spruce-Fir Sawtimber | | | | | | | | | | | | | | | | |
| Well Stocked | 1,094 | | | | | | | | | | | 16.7 | 183 | 83.3 | 911 | 100.0 |
| Medium Stocked | 59,910 | 4.5 | 2,696 | | | 4.5 | 2,696 | 9.1 | 5,452 | 6.9 | 4,134 | 4.5 | 2,696 | 70.5 | 42,236 | 100.0 |
| Poorly Stocked | 46,543 | 7.5 | 3,491 | 17.5 | 8,145 | 17.5 | 8,145 | 12.5 | 5,818 | 12.5 | 5,818 | 2.5 | 1,164 | 30.0 | 13,962 | 100.0 |
| Total | 107,547 | 5.7 | 6,187 | 7.6 | 8,145 | 10.1 | 10,841 | 10.5 | 11,270 | 9.2 | 9,952 | 3.8 | 4,043 | 53.1 | 57,109 | 100.0 |
| Spruce-Fir Poletimber | | | | | | | | | | | | | | | | |
| Well&Med.Stock | 42,077 | 16.7 | 7,027 | 83.3 | 35,050 | | | | | | | | | | | 100.0 |
| Poorly Stocked | *11,407 | 80.0 | 9,126 | | | 20.0 | 2,281 | | | | | | | | | 100.0 |
| Total | 53,484 | 30.2 | 16,153 | 65.5 | 35,050 | 4.3 | 2,281 | | | | | | | | | 100.0 |

*Includes 2,282 acres in the 20-39 age group.

Table 18

Average Volume Per Acre By Species and Crown Density Classes

DOUGLAS-FIR SAWTIMBER TYPE

| Species | Stocking Classes: Medium (VS 1) Int. ¼" B.F. | Medium (VS 1) Scrib. Dec. C B.F. | Medium (VS 1) Cubic C.F. | Poor (VS 2) Int. ¼" B.F. | Poor (VS 2) Scrib. Dec. C B.F. | Poor (VS 2) Cubic C.F. | Weighted Average Int. ¼" B.F. | Weighted Average Scrib. Dec. C B.F. | Weighted Average Cubic C.F. | Percent of Species Based On: Int. ¼" | Scr. Dec. C | Cubic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Douglas-fir | 4,164.53 | 3,216.33 | 1,049.97 | 2,218.25 | 1,752.60 | 540.76 | 2,959.39 | 2,309.99 | 734.67 | 64 | 63 | 55 |
| Ponderosa Pine | 255.76 | 202.18 | 59.85 | 332.54 | 244.84 | 91.05 | 303.30 | 228.60 | 79.17 | 6 | 6 | 6 |
| Lodgepole Pine | 209.46 | 172.73 | 45.88 | 62.24 | 51.68 | 41.55 | 118.30 | 97.78 | 43.20 | 3 | 3 | 3 |
| Limber Pine | 440.46 | 335.97 | 112.05 | 70.64 | 56.64 | 36.71 | 211.47 | 163.01 | 65.40 | 5 | 4 | 5 |
| White Fir | 320.40 | 257.85 | 96.67 | 441.58 | 366.91 | 134.08 | 395.43 | 325.38 | 119.83 | 8 | 9 | 9 |
| Subalpine Fir | 33.63 | 27.87 | 20.59 | | | 3.52 | 12.81 | 10.61 | 10.02 | 0 | 0 | 1 |
| Engelmann Spruce | 911.50 | 749.97 | 276.48 | 297.38 | 252.90 | 72.11 | 531.24 | 435.99 | 149.93 | 11 | 12 | 11 |
| Blue Spruce | | | | 136.14 | 107.27 | 39.60 | 84.30 | 66.42 | 24.52 | 2 | 2 | 2 |
| Aspen | | | 101.58 | 54.32 | 44.71 | 114.26 | 33.63 | 27.68 | 109.43 | 1 | 1 | 8 |
| Total | 6,335.74 | 4,962.90 | 1,763.07 | 3,613.09 | 2,867.55 | 1,073.64 | 4,649.87 | 3,665.46 | 1,336.17 | 100 | 100 | 100 |
| Area in Volume Stratum: Acres | 27,016 | | | 43,935 | | | 70,951 | | | | | |
| Percent | 38.08 | | | 61.92 | | | 100.00 | | | | | |

Table 19

Stock and Stand Table
By D.B.H. and Crown Density Classes

DOUGLAS-FIR SAWTIMBER TYPE

| D.B.H. Classes 10" : 2" | Stocking Classes: Medium (VS 1) No. of Trees | Medium (VS 1) Volume Board Feet Int. ¼" B.F. | Medium (VS 1) Volume Board Feet Scribner Dec. C B.F. | Medium (VS 1) Volume Cubic C.F. | Poor (VS 2) No. of Trees | Poor (VS 2) Volume Board Feet Int. ¼" B.F. | Poor (VS 2) Volume Board Feet Scribner Dec. C B.F. | Poor (VS 2) Volume Cubic C.F. | Weighted Average No. of Trees | Weighted Average Volume Board Feet Int. ¼" B.F. | Weighted Average Volume Board Feet Scribner Dec. C B.F. | Weighted Average Volume Cubic C.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 : 1.0- 2.9: | 89.28: | -- | -- | -- | 140.00: | -- | -- | -- | 120.68: | -- | -- | -- |
| : 3.0- 4.9: | 196.43: | -- | -- | -- | 120.00: | -- | -- | -- | 149.10: | -- | -- | -- |
| 1 : 5.0- 6.9: | 60.73: | | | 140.03: | 62.00: | | | 148.80: | 61.52: | | | 145.46 |
| : 7.0- 8.9: | 60.72: | | | 299.34: | 32.00: | | | 167.39: | 42.94: | | | 217.63 |
| : 9.0-10.9: | 35.72: | 1,088.90: | 664.50: | 278.77: | 16.00: | 461.82: | 283.38: | 129.05: | 23.51: | 700.61: | 428.51: | 186.06 |
| 2 :11.0-12.9: | 23.39: | 1,301.95: | 981.73: | 286.90: | 12.70: | 682.66: | 511.30: | 153.78: | 16.77: | 918.49: | 690.44: | 204.47 |
| :13.0-14.9: | 12.15: | 995.03: | 795.42: | 206.40: | 5.70: | 470.21: | 375.89: | 97.51: | 8.16: | 670.06: | 535.65: | 138.98 |
| :15.0-16.9: | 6.97: | 895.48: | 748.03: | 174.03: | 4.80: | 575.33: | 476.89: | 113.61: | 5.63: | 697.24: | 580.14: | 136.62 |
| :17.0-18.9: | 2.86: | 467.61: | 397.08: | 88.08: | 3.10: | 564.27: | 481.50: | 105.99: | 3.01: | 527.46: | 449.35: | 99.17 |
| :19.0-20.9: | 3.04: | 750.29: | 648.88: | 137.74: | 1.10: | 275.42: | 238.41: | 50.02: | 1.84: | 456.25: | 394.72: | 83.42 |
| 3 :21.0-22.9: | 1.43: | 389.96: | 326.85: | 72.33: | 1.10: | 319.56: | 268.55: | 61.14: | 1.23: | 346.37: | 290.75: | 65.40 |
| :23.0-24.9: | .36: | 135.49: | 117.31: | 23.54: | .20: | 81.26: | 70.82: | 14.07: | .26: | 101.91: | 88.52: | 17.68 |
| :25.0-26.9: | -- : | -- : | -- : | -- : | .10: | 40.72: | 35.41: | 7.04: | .06: | 25.22: | 21.93: | 4.36 |
| :27.0-28.9: | .18: | 99.52: | 89.14: | 18.76: | .30: | 141.84: | 125.40: | 25.24: | .25: | 125.73: | 111.59: | 22.77 |
| :29.0-30.9: | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- |
| 4 :31.0-32.9: | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- |
| :33.0-34.9: | .18: | 211.51: | 193.96: | 37.15: | | -- : | -- : | -- : | .07: | 80.54: | 73.86: | 14.15 |
| :35.0-36.9: | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- |
| :37.0-38.9: | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- : | -- |
| Total | 493.44: | 6,335.74: | 4,962.90: | 1,763.07: | 399.10: | 3,613.09: | 2,867.55: | 1,073.64: | 435.03: | 4,649.87: | 3,665.46: | 1,336.17 |

Table 20

Average Net Volume Per Acre By Species and Crown Density Classes

PONDEROSA PINE SAWTIMBER TYPE

| Species | Stocking Classes: Medium (VS 3) Int. ¼" B.F. | Medium (VS 3) Scribner: Dec. C B.F. | Medium (VS 3) Cubic C.F. | Poor (VS 4) Int. ¼" B.F. | Poor (VS 4) Scribner: Dec. C B.F. | Poor (VS 4) Cubic C.F. | Weighted Average Int. ¼" B.F. | Weighted Average Scribner: Dec. C B.F. | Weighted Average Cubic C.F. | Percent of Species Based On: Int. ¼" B.F. | Scrib: Dec. C B.F. | Cubic C.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Douglas-fir | 2,084.26 | 1,880.37 | 395.08 | 332.12 | 270.18 | 82.79 | 594.59 | 511.39 | 129.57 | 27 | 29 | 22 |
| Ponderosa Pine | 1,487.00 | 1,140.00 | 381.41 | 1,331.34 | 1,013.06 | 350.35 | 1,354.66 | 1,032.08 | 355.00 | 62 | 60 | 60 |
| Lodgepole Pine | | | | 53.88 | 43.98 | 10.40 | 45.81 | 37.39 | 8.84 | 2 | 2 | 2 |
| Limber Pine | | | | 44.64 | 27.92 | 17.67 | 37.95 | 23.74 | 15.02 | 2 | 1 | 3 |
| White Fir | | | | 124.53 | 94.37 | 30.90 | 105.87 | 80.23 | 26.27 | 5 | 5 | 4 |
| Blue Spruce | | | | 61.77 | 52.50 | 11.74 | 52.52 | 44.63 | 9.98 | 2 | 3 | 2 |
| Juniper | | | | | | 1.17 | | | 1.00 | | | 0 |
| Aspen | | | 90.00 | | | 32.15 | | | 40.82 | | | 7 |
| Total | 3,571.26 | 3,020.37 | 866.49 | 1,948.28 | 1,502.01 | 537.17 | 2,191.40 | 1,729.46 | 586.50 | 100 | 100 | 100 |

| Area in Volume Stratum | | | |
|---|---|---|---|
| Acres | 9,193 | 52,177 | 61,370 |
| Percent | 14.98 | 85.02 | 100 |

Table 21

Stock and Stand Table
By D.B.H. and Crown Density Classes

PONDEROSA PINE SAWTIMBER TYPE

| D.B.H. Classes | | Stocking Classes: Medium (VS 3) | | | | Poor (VS 4) | | | | Weighted Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Volume | | | | Volume | | | | Volume | | |
| | | | Board Feet | | | | Board Feet | | | | Board Feet | | |
| 10" | 2" | No. of Trees | Int. ¼" B.F. | Scribner Dec. C B.F. | Cubic C.F. | No. of Trees | Int. ¼" B.F. | Scribner Dec. C B.F. | Cubic C.F. | No. of Trees | Int. ¼" B.F. | Scribner Dec. C B.F. | Cubic C.F. |
| 0 | 1.0- 2.9 | | | | | 130.94 | | | | 111.32 | | | |
| | 3.0- 4.9 | 125.00 | | | | 35.71 | | | | 49.09 | | | |
| 1 | 5.0- 6.9 | 37.50 | | | 69.43 | 32.14 | | | 44.70 | 32.94 | | | 48.40 |
| | 7.0- 8.9 | 25.00 | | | 86.45 | 11.90 | | | 33.89 | 13.86 | | | 41.76 |
| | 9.0-10.9 | | | | | 3.57 | 52.05 | 24.74 | 20.29 | 3.03 | 44.25 | 21.03 | 17.25 |
| 2 | 11.0-12.9 | 3.75 | 131.63 | 87.88 | 37.90 | 9.88 | 330.92 | 219.59 | 96.17 | 8.96 | 301.07 | 199.86 | 87.44 |
| | 13.0-14.9 | 7.50 | 397.00 | 290.00 | 101.25 | 6.55 | 426.12 | 327.04 | 99.80 | 6.69 | 421.76 | 321.49 | 100.02 |
| | 15.0-16.9 | 6.25 | 663.00 | 533.00 | 139.95 | 3.58 | 340.48 | 272.23 | 72.65 | 3.98 | 388.79 | 311.29 | 82.73 |
| | 17.0-18.9 | 1.25 | 163.00 | 134.00 | 33.08 | 1.19 | 159.10 | 131.29 | 31.64 | 1.21 | 159.68 | 131.70 | 31.86 |
| | 19.0-20.9 | | | | | .96 | 214.98 | 183.45 | 40.15 | .82 | 182.78 | 155.97 | 34.14 |
| 3 | 21.0-22.9 | 1.75 | 183.00 | 130.00 | 55.02 | .83 | 186.35 | 147.66 | 44.33 | .89 | 185.85 | 145.02 | 45.93 |
| | 23.0-24.9 | | | | | .71 | 186.21 | 150.98 | 43.28 | .60 | 158.31 | 128.36 | 36.80 |
| | 25.0-26.9 | | | | | | | | | | | | |
| | 27.0-28.9 | | | | | .12 | 52.07 | 45.03 | 10.27 | .10 | 44.27 | 38.29 | 8.73 |
| | 29.0-30.9 | 1.25 | 737.33 | 659.03 | 125.67 | | | | | .19 | 110.45 | 98.72 | 18.82 |
| 4 | 31.0-32.9 | | | | | | | | | | | | |
| | 33.0-34.9 | | | | | | | | | | | | |
| | 35.0-36.9 | | | | | | | | | | | | |
| | 37.0-38.9 | 1.25 | 1,296.30 | 1,186.46 | 217.74 | | | | | .19 | 194.19 | 177.73 | 32.62 |
| Total | | 210.00 | 3,571.26 | 3,020.37 | 866.49 | 238.08 | 1,948.28 | 1,502.01 | 537.17 | 233.87 | 2,191.40 | 1,729.46 | 586.50 |

Table 22

Average Net Volume Per Acre By Species and Crown Density Classes

LODGEPOLE PINE SAWTIMBER TYPE

| Species | Stocking Classes: Medium (VS 5) Int. ¼" B.F. | Medium (VS 5) Scribner: Dec. C B.F. | Medium (VS 5) Cubic C.F. | Poor (VS 6) Int. ¼" B.F. | Poor (VS 6) Scribner: Dec. C B.F. | Poor (VS 6) Cubic C.F. | Weighted Average Int. ¼" B.F. | Weighted Average Scribner: Dec. C B.F. | Weighted Average Cubic C.F. | Percent of Species Based On: Int. ¼" | Scrib.: Dec C | Cubic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Douglas-fir | 111.00 | 93.00 | 21.38 | 38.89 | 29.25 | 23.52 | 66.48 | 53.64 | 22.70 | 1 | 1 | 1 |
| Lodgepole Pine | 3,669.13 | 2,973.56 | 1,306.35 | 4,181.83 | 3,258.51 | 1,492.45 | 3,985.67 | 3,149.49 | 1,421.25 | 70 | 69 | 76 |
| Limber Pine | 888.63 | 722.63 | 171.52 | 120.56 | 94.27 | 31.53 | 414.42 | 334.68 | 85.09 | 7 | 7 | 4 |
| Subalpine Fir | 59.37 | 47.50 | 12.69 | 36.16 | 27.86 | 8.08 | 45.04 | 35.37 | 9.84 | 1 | 1 | 1 |
| Engelmann Spruce | 2,237.91 | 1,827.40 | 609.92 | 586.72 | 444.99 | 173.91 | 1,218.47 | 973.90 | 340.73 | 21 | 22 | 18 |
| Total | 6,966.04 | 5,664.09 | 2,121.86 | 4,964.16 | 3,854.88 | 1,729.49 | 5,730.08 | 4,547.08 | 1,879.61 | 100 | 100 | 100 |

| Area in Volume Stratum | | | |
|---|---|---|---|
| Acres | 9,567 | 15,440 | 25,007 |
| Percent | 38.26 | 61.74 | 100 |

Table 23

Stock and Stand Table
By D.B.H. and Crown Density Classes

LODGEPOLE PINE SAWTIMBER TYPE

| D.B.H. Classes 10" | 2" | Stocking Classes: Medium (VS 5) No. of Trees | Volume Board Feet Int. ¼" B.F. | Volume Board Feet Scribner: Dec. C B.F. | Volume Cubic C.F. | Poor (VS 6) No. of Trees | Volume Board Feet Int. ¼" B.F. | Volume Board Feet Scribner: Dec. C B.F. | Volume Cubic C.F. | Weighted Average No. of Trees | Volume Board Feet Int. ¼" B.F. | Volume Board Feet Scribner: Dec. C B.F. | Volume Cubic C.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1.0- 2.9 | 833.33 | -- | -- | -- | -- | -- | -- | -- | 318.83 | | | |
| | 3.0- 4.9 | 166.66 | -- | -- | -- | 35.71 | -- | -- | -- | 85.81 | | | |
| 1 | 5.0- 6.9 | 75.00 | | | 309.93 | 85.72 | | | 291.91 | 81.62 | | | 298.80 |
| | 7.0- 8.9 | 58.34 | | | 471.96 | 78.57 | | | 498.62 | 70.83 | | | 488.42 |
| | 9.0-10.9 | 16.66 | 898.33 | 653.67 | 168.31 | 42.85 | 2,555.91 | 1,899.41 | 471.50 | 32.83 | 1,921.72 | 1,422.79 | 355.50 |
| 2 | 11.0-12.9 | 30.00 | 2,197.97 | 1,737.73 | 428.33 | 16.78 | 1,179.38 | 929.88 | 231.19 | 21.84 | 1,569.09 | 1,238.96 | 306.62 |
| | 13.0-14.9 | 15.00 | 1,577.20 | 1,304.50 | 303.43 | 7.15 | 685.42 | 562.00 | 132.49 | 10.15 | 1,026.62 | 846.08 | 197.89 |
| | 15.0-16.9 | 6.66 | 891.72 | 752.53 | 170.93 | 2.15 | 283.57 | 239.37 | 54.24 | 3.88 | 516.25 | 435.70 | 98.89 |
| | 17.0-18.9 | .83 | 128.66 | 109.99 | 24.53 | 1.43 | 259.88 | 224.22 | 49.54 | 1.20 | 209.67 | 180.52 | 39.96 |
| | 19.0-20.9 | 1.66 | 394.70 | 342.58 | 74.68 | | -- | -- | | .63 | 151.01 | 131.07 | 28.58 |
| 3 | 21.0-22.9 | 2.50 | 877.46 | 763.09 | 169.76 | | -- | -- | | .96 | 335.72 | 291.96 | 64.95 |
| | 23.0-24.9 | | -- | -- | -- | | -- | -- | | | | | |
| | 25.0-26.9 | | -- | -- | -- | | -- | -- | | | | | |
| | 27.0-28.9 | | -- | -- | -- | | -- | -- | | | | | |
| | 29.0-30.9 | | -- | -- | -- | | -- | -- | | | | | |
| 4 | 31.0-32.9 | | -- | -- | -- | | -- | -- | | | | | |
| | 33.0-34.9 | | -- | -- | -- | | -- | -- | | | | | |
| | 35.0-36.9 | | -- | -- | -- | | -- | -- | | | | | |
| | 37.0-38.9 | | -- | -- | -- | | -- | -- | | | | | |
| Total | | 1,206.64 | 6,966.04 | 5,664.09 | 2,121.86 | 270.36 | 4,964.16 | 3,854.88 | 1,729.49 | 628.58 | 5,730.08 | 4,547.08 | 1,879.61 |

Table 24

Average Net Volume Per Acre By Species and Crown Density Classes

LODGEPOLE PINE POLETIMBER TYPE

| Species | Stocking Classes: Well (VS-19) Cubic Feet | Medium (VS-20) Cubic Feet | Weighted Average Cubic Feet | Percent of Species Based on Cubic Feet |
|---|---|---|---|---|
| Douglas-fir | 4.12 | 21.82 | 12.51 | .82 |
| Ponderosa Pine | -- | 4.58 | 2.17 | .14 |
| Lodgepole Pine | 1,385.10 | 1,004.55 | 1,204.68 | 79.07 |
| White Fir | 7.09 | -- | 3.73 | .24 |
| Subalpine Fir | 31.20 | 9.33 | 20.83 | 1.37 |
| Engelmann Spruce | 83.59 | 291.43 | 182.13 | 11.95 |
| Aspen | 185.62 | -- | 97.62 | 6.41 |
| Total | 1,696.72 | 1,331.71 | 1,523.67 | 100.00 |
| Area in Volume Stratum | | | | |
| Acres | 36,341 | 32,764 | 69,105 | |
| Percent | 52.59 | 47.41 | 100 | |

Table 25

Stock and Stand Table
By D.B.H. and Crown Density Classes

LODGEPOLE PINE POLETIMBER TYPE

Average Per Acre

| D.B.H. Classes 10" : 2 " | Stocking Classes: Well (VS-19) No. of Trees | Well (VS-19) Cubic Feet | Medium (VS-20) No. of Trees | Medium (VS-20) Cubic Feet | Weighted Average No. of Trees | Weighted Average Cubic Feet |
|---|---|---|---|---|---|---|
| 0 : 1.0- 2.9: | 250.00 | -- | 196.43 | -- | 224.60 | -- |
| : 3.0- 4.9: | 437.50 | -- | 142.86 | -- | 297.82 | -- |
| 1 : 5.0- 6.9: | 253.13 | 847.71 | 130.36 | 450.98 | 194.92 | 659.62 |
| : 7.0- 8.9: | 65.63 | 377.32 | 55.35 | 356.96 | 60.77 | 367.67 |
| : 9.0-10.9: | 31.26 | 331.55 | 26.79 | 272.44 | 29.14 | 303.53 |
| 2 :11.0-12.9: | 4.69 | 68.29 | 5.53 | 85.11 | 5.09 | 76.25 |
| :13.0-14.9: | 1.88 | 40.69 | 3.58 | 85.66 | 2.69 | 62.01 |
| :15.0-16.9: | .31 | 11.37 | .72 | 25.01 | .50 | 17.84 |
| :17.0-18.9: | -- | -- | .18 | 4.58 | .08 | 2.17 |
| :19.0-20.9: | .31 | 19.79 | .18 | 13.79 | .25 | 16.94 |
| 3 :21.0-22.9: | -- | -- | -- | -- | -- | -- |
| :23.0-24.9: | -- | -- | .18 | 12.60 | .08 | 5.97 |
| :25.0-26.9: | -- | -- | .18 | 24.58 | .08 | 11.65 |
| Total | 1,044.71 | 1,696.72 | 562.34 | 1,331.71 | 816.02 | 1,523.67 |

Table 26

Average Net Volume Per Acre By Species and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

| Species | Stand Size and Stocking Classes: Small Sawtimber: Well (VS-12): Board Feet Int. ¼" | Well (VS-12): Board Feet Scribner | Well (VS-12): Cubic Feet | Medium (VS-13): Board Feet Int. ¼" | Medium (VS-13): Board Feet Scribner | Medium (VS-13): Cubic Feet |
|---|---|---|---|---|---|---|
| Douglas-fir | -- | -- | -- | 86.45 | 69.17 | 17.90 |
| Lodgepole Pine | -- | -- | -- | 117.30 | 92.21 | 21.91 |
| Limber Pine | 121.99 | 90.00 | 24.15 | 89.37 | 72.31 | 17.28 |
| White Fir | -- | -- | -- | 6.18 | 4.48 | 1.46 |
| Subalpine Fir | 830.59 | 679.35 | 297.03 | 1,075.49 | 863.20 | 407.06 |
| Engelmann Spruce | 17,686.28 | 14,621.63 | 4,000.26 | 11,293.72 | 9,299.15 | 2,551.40 |
| Aspen | -- | -- | -- | -- | -- | -- |
| Total | 18,638.86 | 15,390.98 | 4,321.44 | 12,668.51 | 10,400.52 | 3,017.01 |
| Area in Volume Stratum | | | | | | |
| Acres | 1,094 | | | 59,910 | | |
| Percent | 1.02 | | | 55.70 | | |

| Species | Stand Size and Stocking Classes: Small Sawtimber: Poor (VS-14): Board Feet Int. ¼" | Poor (VS-14): Board Feet Scribner | Poor (VS-14): Cubic Feet | Weighted Average: Board Feet Int. ¼" | Weighted Average: Board Feet Scribner | Weighted Average: Cubic Feet | Percent of Species Based On: Int. ¼" | Scribner | Cubic Feet |
|---|---|---|---|---|---|---|---|---|---|
| Douglas-fir | 98.56 | 73.79 | 44.40 | 90.81 | 70.46 | 29.19 | .96 | .91 | 1.24 |
| Lodgepole Pine | 449.75 | 343.85 | 125.66 | 259.99 | 200.19 | 66.59 | 2.73 | 2.56 | 2.84 |
| Limber Pine | 18.00 | 14.30 | 9.69 | 58.82 | 47.38 | 14.06 | .62 | .61 | .60 |
| White Fir | -- | -- | -- | 3.44 | 2.49 | .81 | .04 | .03 | .03 |
| Subalpine Fir | 176.56 | 140.61 | 91.88 | 683.93 | 548.59 | 269.53 | 7.20 | 7.07 | 11.51 |
| Engelmann Spruce | 4,462.83 | 3,644.04 | 1,133.45 | 8,402.51 | 6,905.91 | 1,952.49 | 88.45 | 88.82 | 83.33 |
| Aspen | -- | -- | 25.21 | -- | -- | 10.91 | | | .05 |
| Total | 5,205.70 | 4,216.59 | 1,430.29 | 9,499.50 | 7,775.02 | 2,343.58 | 100.00 | 100.00 | 100.00 |
| Area in Volume Stratum | | | | | | | | | |
| Acres | 46,543 | | | 107,547 | | | | | |
| Percent | 43.28 | | | 100.00 | | | | | |

Table 27

Stock and Stand Table
By D.B.H. and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

| D.B.H. Class | | Stocking Classes: Well (VS-12) | | | | Medium (VS-13) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Volume | | | | Volume | | |
| | | | Board Feet | | | | Board Feet | | |
| 10" | 2" | No. of Trees | Int. ¼" | Scribner Dec. C | Cubic Feet | No. of Trees | Int. ¼" | Scribner Dec. C | Cubic Feet |
| 0 | 1.0- 2.9 | 416.66 | | | | 131.58 | | | |
| | 3.0- 4.9 | 83.33 | | | | 131.58 | | | |
| | 5.0- 6.9 | 100.00 | | | 362.23 | 76.31 | | | 234.35 |
| 1 | 7.0- 8.9 | 66.66 | | | 360.28 | 56.58 | | | 338.17 |
| | 9.0-10.9 | 33.33 | 1,550.99 | 1,081.00 | 295.85 | 38.16 | 2,183.71 | 1,615.34 | 413.40 |
| | 11.0-12.9 | 50.00 | 3,825.50 | 3,042.14 | 754.96 | 31.20 | 2,420.81 | 1,930.23 | 480.89 |
| | 13.0-14.9 | 35.00 | 4,226.63 | 3,518.54 | 816.51 | 20.13 | 2,332.39 | 1,936.47 | 452.75 |
| 2 | 15.0-16.9 | 17.50 | 3,229.40 | 2,759.44 | 614.76 | 10.39 | 1,693.35 | 1,438.92 | 323.52 |
| | 17.0-18.9 | 10.00 | 2,200.84 | 1,897.66 | 417.83 | 5.78 | 1,253.46 | 1,080.09 | 237.96 |
| | 19.0-20.9 | 5.00 | 1,698.70 | 1,484.14 | 319.02 | 3.55 | 972.96 | 845.14 | 183.53 |
| | 21.0-22.9 | 5.83 | 1,906.80 | 1,608.06 | 380.00 | 2.50 | 883.56 | 7,518.00 | 173.91 |
| | 23.0-24.9 | | | | | 1.05 | 366.87 | 311.60 | 72.35 |
| | 25.0-26.9 | | | | | .66 | 282.48 | 244.97 | 54.09 |
| 3 | 27.0-28.9 | | | | | .39 | 193.25 | 169.37 | 36.41 |
| | 29.0-30.9 | | | | | .13 | 85.67 | 76.59 | 15.68 |
| Total | | 823.31 | 18,638.86 | 15,390.98 | 4,321.44 | 509.99 | 12,668.51 | 10,400.52 | 3,017.01 |

(Table Continued)

Table 27 (Continued)

Stock and Stand Table
By D.B.H. and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

| D.B.H. Class | | Stocking Classes: Poor (VS-14) | | | | Weighted Average | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Volume | | | | Volume | | |
| | | | Board Feet | | | | Board Feet | | |
| 10" | 2" | No. of Trees | Int. ¼" | Scribner Dec. C | Cubic Feet | No. of Trees | Int. ¼" | Scribner Dec. C | Cubic Feet |
| 0 | 1.0- 2.9: | 137.50: | | | | 137.05 | | | |
| | 3.0- 4.9: | 87.50: | | | | 112.01 | | | |
| | 5.0- 6.9: | 60.00: | | | 175.41 | 69.49 | | | 210.14 |
| 1 | 7.0- 8.9: | 47.50: | | | 253.86 | 52.75 | | | 301.91 |
| | 9.0-10.9: | 22.50: | 1,070.78: | 754.78 | 206.25 | 31.33 | 1,695.58 | 1,237.44 | 322.54 |
| | 11.0-12.9: | 12.15: | 823.87: | 643.11 | 162.74 | 23.15 | 1,743.98 | 1,384.51 | 345.99 |
| | 13.0-14.9: | 8.76: | 1,014.49: | 840.72 | 195.44 | 15.37 | 1,781.32 | 1,478.37 | 345.10 |
| 2 | 15.0-16.9: | 4.89: | 730.01: | 617.37 | 139.76 | 8.08 | 1,292.08 | 1,096.82 | 246.96 |
| | 17.0-18.9: | 2.13: | 439.96: | 378.89 | 83.61 | 4.24 | 911.04 | 784.95 | 172.99 |
| | 19.0-20.9: | 1.13: | 302.17: | 262.40 | 56.99 | 2.52 | 690.04 | 599.45 | 130.14 |
| | 21.0-22.9: | .63: | 230.54: | 197.25 | 45.10 | 1.72 | 611.37 | 520.52 | 120.26 |
| | 23.0-24.9: | .25: | 82.88: | 70.04 | 16.48 | .69 | 240.22 | 203.87 | 47.43 |
| | 25.0-26.9: | .76: | 331.75: | 290.87 | 62.11 | .70 | 300.93 | 262.34 | 57.01 |
| 3 | 27.0-28.9: | .25: | 179.25: | 161.16 | 32.54 | .33 | 185.22 | 164.09 | 34.36 |
| | 29.0-30.9: | | | | | .07 | 47.72 | 42.66 | 8.73 |
| Total | | 385.95: | 5,205.70: | 4,216.59 | 1,430.29: | 459.50 | 9,499.50 | 7,775.02 | 2,343.57 |

Table 28

Average Net Volume Per Acre By Species and Crown Density Classes

ASPEN, SMALL SAWTIMBER AND POLETIMBER SIZE TYPES

| Species | Stocking Classes: VS-25 Cubic Feet | VS-26 Cubic Feet | Wt. Average Cubic Feet | Percent of Species Based On Cubic Feet |
|---|---|---|---|---|
| Douglas-fir | 581.93 | 6.83 | 14.02 | 1.29 |
| Ponderosa Pine | 31.95 | 9.29 | 9.57 | .88 |
| Lodgepole Pine | -- | 34.44 | 34.01 | 3.12 |
| Limber Pine | -- | 17.18 | 16.96 | 1.56 |
| Engelmann Spruce | 50.51 | 46.37 | 46.42 | 4.26 |
| Other Hardwood | 610.11 | 23.19 | 30.53 | 2.80 |
| Aspen | 823.06 | 939.24 | 937.79 | 86.09 |
| Total | 2,097.56 | 1,076.54 | 1,089.30 | 100.00 |
| Area in Volume Stratum | | | | |
| Acres | 1,020 | 80,872 | 81,892 | |
| Percent | 1.25 | 98.75 | 100.00 | |

Table 29

Stock and Stand Table
By D.B.H. and Crown Density Classes

ASPEN, SMALL SAWTIMBER AND POLETIMBER SIZE TYPES

| D.B.H. Class | | Average Per Acre Stocking Classes VS-25 No. of Trees | VS-25 Cubic Feet | VS-26 No. of Trees | VS-26 Cubic Feet | Weighted Average No. of Trees | Weighted Average Cubic Feet |
|---|---|---|---|---|---|---|---|
| 10" | 2" | | | | | | |
| 0 | 1.0- 2.9 | | | 134.61 | | 132.93 | |
| | 3.0- 4.9 | 500.00 | | 326.92 | | 329.08 | |
| 1 | 5.0- 6.9 | 75.00 | 204.40 | 150.01 | 396.12 | 149.07 | 393.72 |
| | 7.0- 8.9 | 100.00 | 553.90 | 61.53 | 373.14 | 62.01 | 375.40 |
| | 9.0-10.9 | 75.00 | 711.25 | 24.99 | 236.26 | 25.61 | 242.20 |
| 2 | 11.0-12.9 | 20.00 | 309.39 | 2.70 | 37.28 | 2.93 | 40.68 |
| | 13.0-14.9 | 7.50 | 141.00 | .19 | 4.02 | .28 | 5.73 |
| | 15.0-16.9 | 2.50 | 64.36 | .57 | 9.67 | .59 | 10.36 |
| | 17.0-18.9 | | | | | | |
| | 19.0-20.9 | 2.50 | 113.26 | .19 | 6.45 | .22 | 7.78 |
| 3 | 21.0-22.9 | | | .19 | 13.60 | .19 | 13.43 |
| Total | | 782.50 | 2,097.56 | 701.90 | 1,076.54 | 702.91 | 1,089.30 |

Table 30

Area, Volume Per Acre, and Total Volume By Volume Stratum For Unreserved National Forest Lands

San Isabel Working Circle

| Volume Stratum No. | Type | SSC | SC | No. of Locations | Area Acres | Volume Per Acre: Int. ¼" B.F. | Scrib. Dec. C B.F. | Cubic C.F. | Total Volume: Int. ¼" M B.F. | Scrib. Dec. C M B.F. | Cubic M C. F. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Douglas-fir | LST | Med. | 0 | 111 | Use VS-1 | | | 703 | 551 | 196 |
| | Douglas-fir | SST | Well | 0 | 220 | Use VS-1 | | | 1,394 | 1,092 | 388 |
| 1 | Douglas-fir | SST | Med. | 14 | 26,685 | 6,335.74 | 4,962.90 | 1,763.07 | 169,069 | 132,435 | 47,048 |
| 2 | Douglas-fir | SST | Poor | 25 | 43,935 | 3,613.09 | 2,861.55 | 1,073.64 | 158,741 | 125,986 | 47,170 |
| | Ponderosa Pine | LST | Poor | 0 | 70 | Use VS-3 | | | 250 | 211 | 61 |
| 3 | Ponderosa Pine | SST | Med. | 2 | 9,193 | 3,571.26 | 3,020.37 | 866.49 | 32,831 | 27,766 | 7,966 |
| 4 | Ponderosa Pine | SST | Poor | 21 | 52,107 | 1,948.28 | 1,502.01 | 537.17 | 101,519 | 78,265 | 27,990 |
| | Lodgepole Pine | SST | Well | 0 | 160 | Use VS-5 | | | 1,115 | 906 | 339 |
| 5 | Lodgepole Pine | SST | Med. | 3 | 9,407 | 6,966.04 | 5,664.09 | 2,121.86 | 65,530 | 53,282 | 19,960 |
| 6 | Lodgepole Pine | SST | Poor | 7 | 15,440 | 4,964.16 | 3,854.88 | 1,729.49 | 76,647 | 59,519 | 26,703 |
| 7 | Limber Pine | SST | Med. | 3 | 490 | 7,821.44 | 6,563.83 | 1,658.25 | 3,833 | 3,216 | 813 |
| 8 | Limber Pine | SST | Poor | 1 | 1,742 | 2,455.00 | 1,634.50 | 770.59 | 4,277 | 2,847 | 1,342 |
| | White Fir | SST | Well | 0 | 100 | Use VS-9 | | | 842 | 686 | 208 |
| 9 | White Fir | SST | Med. | 4 | 575 | 8,424.78 | 6,863.43 | 2,075.73 | 4,844 | 3,946 | 1,194 |
| 10 | White Fir | SST | Poor | 3 | 1,059 | 2,717.73 | 2,148.36 | 926.19 | 2,878 | 2,275 | 981 |
| 11 | Spruce-Fir | LST | Med. | 1 | 0 | | | 7,174.07 | 0 | 0 | 0 |
| 12 | Spruce-Fir | SST | Well | 3 | 1,094 | 18,638.86 | 15,390.98 | 4,321.44 | 20,391 | 16,838 | 4,728 |
| 13 | Spruce-Fir | SST | Med. | 19 | 59,910 | 12,668.51 | 10,400.52 | 3,017.01 | 758,970 | 623,095 | 180,749 |
| 14 | Spruce-Fir | SST | Poor | 20 | 46,543 | 5,205.70 | 4,216.59 | 1,430.29 | 242,289 | 196,253 | 66,570 |
| Total Sawtimber | | | | 126 | 268,841 | 6,123.03 | 4,944.07 | 1,615.84 | 1,646,123 | 1,329,169 | 434,406 |
| 15 | Douglas-fir | PT | Well | 5 | 23,571 | | | 1,469.90 | | | 34,647 |
| 16 | Douglas-fir | PT | Med. | 5 | 18,945 | | | 945.56 | | | 17,914 |
| 17 | Douglas-fir | PT | Poor | 2 | 1,979 | | | 666.59 | | | 1,319 |
| | Ponderosa Pine | PT | Well | 0 | 739 | | | 175.66 | | | 130 |
| 18 | Ponderosa Pine | PT | M&P | 4 | 21,053 | | | 175.66 | | | 3,698 |

(Table Continued)

Table 30 (Continued)

Area, Volume Per Acre, and Total Volume By Volume Stratum For Unreserved National Forest Lands

San Isabel Working Circle

| Volume Stratum No. | Type | SSC | SC | No. of Locations | Area Acres | Volume Per Acre: Int. ¼" B.F. | Volume Per Acre: Scrib. Dec. C B.F. | Volume Per Acre: Cubic C.F. | Total Volume: Int. ¼" M B.F. | Total Volume: Scrib. Dec. C M B.F. | Total Volume: Cubic M C.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | Lodgepole Pine | PT | Well | 8 | 36,341 | | | 1,696.72 | | | 61,661 |
| 20 | Lodgepole Pine | PT | Med. | 14 | 32,764 | | | 1,331.71 | | | 43,633 |
| | Lodgepole Pine | PT | Poor | 0 | 2,545 | Use VS-20 | | 1,331.71 | | | 3,389 |
| | Limber Pine | PT | Well | 0 | 250 | Use Pike VS-20 | | 694.92 | | | 174 |
| | Limber Pine | PT | Med. | 0 | 3,212 | Use Pike VS-20 | | 694.92 | | | 2,232 |
| | Limber Pine | PT | Poor | 0 | 380 | Use Pike VS-21 | | 375.42 | | | 143 |
| | White Fir | PT | Well | 0 | 2,006 | Use VS-15 | | 1,469.90 | | | 2,949 |
| | White Fir | PT | Med. | 0 | 490 | Use VS-16 | | 945.56 | | | 463 |
| 21 | Spruce-Fir | PT | W&M | 4 | 42,077 | | | 1,055.69 | | | 44,420 |
| 22 | Spruce-Fir | PT | Poor | 3 | 11,407 | | | 283.48 | | | 3,234 |
| Total Poletimber | | | | 45 | 197,759 | | | 1,112.49 | | | 220,006 |
| 23 | Douglas-fir | S-S | All | 0 | 235 | | | | | | |
| | Ponderosa Pine | S-S | All | 0 | 310 | | | | | | |
| | Lodgepole Pine | S-S | All | 4 | 13,181 | | | 453.98 | | | |
| | Limber Pine | S-S | All | 0 | 219 | | | | | | |
| | Spruce-Fir | S-S | All | 0 | 1,714 | | | | | | |
| | Dead Spruce | | | 0 | 30 | | | | | | |
| Total Seedling-Sapling | | | | 4 | 15,689 | | | 453.98 | | | 7,122 |
| 24 | Douglas-fir | NS | All | 0 | 30 | | | | | | |
| | Lodgepole Pine | NS | All | 0 | 110 | | | | | | |
| | Spruce-Fir | NS | All | 2 | 9,994 | | | 0 | | | |
| Total Nonstocked | | | | 2 | 10,134 | | | | | | |
| Total Softwoods | | | | 177 | 492,423 | | | | 1,646,123 | 1,329,167 | 661,360 |
| 25 | Aspen | SST | All | 1 | 1,020 | 6,658.61 | 5,126.38 | 2,097.56 | 6,792 | 5,229 | 2,140 |
| 26 | Aspen | PT | All | 13 | 80,872 | | | 1,076.54 | | | 87,062 |
| 27 | Aspen | S-S | All | 3 | 24,454 | | | 40.83 | | | 998 |
| Total Hardwoods | | | | 17 | 106,346 | | | | 6,792 | 5,229 | 90,200 |
| Grand Total | | | | 194 | 598,769 | | | | | | 751,734 |

Note: Board foot volume is in trees 9.0" d.b.h. and larger. Cubic foot volume is in trees 5.0" d.b.h. and larger.

Table 31

Area and Volume By Volume Stratum and Total Volume For State and Privately Owned Lands

| Volume Stratum No. | Type | SSC | SC | Volume Per Acre: Int. 1/4" B.F. | Volume Per Acre: Scrib. Dec. C B.F. | Volume Per Acre: Cubic Feet C.F. | State & County Lands: Area Acres | State & County Lands: Total Volume Int. 1/4" M B.F. | State & County Lands: Total Volume Scrib. Dec. C M B.F. | State & County Lands: Total Volume Cubic Feet M C.F. | Privately Owned Lands: Area Acres | Privately Owned Lands: Total Volume Int. 1/4" M B.F. | Privately Owned Lands: Total Volume Scrib. Dec. C M B.F. | Privately Owned Lands: Total Volume Cubic Feet M C.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Douglas-fir | SST | Med. | 6,335.74 | 4,962.90 | 1,763.07 | 529 | 3,352 | 2,625 | 933 | 3,184 | 19,539 | 15,306 | 5,437 |
| 2 | Douglas-fir | SST | Poor | 3,613.09 | 2,867.55 | 1,073.64 | 1,706 | 6,164 | 4,892 | 1,831 | 5,606 | 20,255 | 16,075 | 6,019 |
| 3 | Ponderosa Pine | SST | Med. | 3,571.26 | 3,020.37 | 866.49 | 40 | 143 | 121 | 35 | 2,451 | 8,753 | 7,403 | 2,124 |
| 4 | Ponderosa Pine | SST | Poor | 1,948.28 | 1,502.01 | 537.17 | 1,485 | 2,893 | 2,230 | 798 | 11,945 | 23,272 | 17,941 | 6,416 |
| 5 | Lodgepole Pine | SST | Med. | 6,966.04 | 5,664.09 | 2,121.86 | | | | | 546 | 3,803 | 3,093 | 1,158 |
| 6 | Lodgepole Pine | SST | Poor | 4,964.16 | 3,854.88 | 1,729.49 | 80 | 397 | 308 | 138 | 592 | 2,939 | 2,282 | 1,024 |
| 7 | Limber Pine | SST | Med. | 7,821.44 | 6,563.83 | 1,658.25 | | | | | 60 | 469 | 394 | 99 |
| 8 | Limber Pine | SST | Poor | 2,455.00 | 1,634.50 | 770.59 | | | | | 190 | 466 | 310 | 146 |
| 9 | White Fir | SST | Med. | 8,424.78 | 6,863.43 | 2,075.73 | | | | | 185 | 1,559 | 1,270 | 384 |
| 10 | White Fir | SST | Poor | 2,717.73 | 2,148.36 | 926.19 | | | | | 90 | 245 | 193 | 83 |
| 12 | Spruce-Fir | SST | Well | 18,638.86 | 15,390.98 | 4,321.44 | | | | | 50 | 932 | 769 | 216 |
| 13 | Spruce-Fir | SST | Med. | 12,668.51 | 10,400.52 | 3,017.01 | 130 | 1,647 | 1,352 | 392 | 2,240 | 28,377 | 23,297 | 6,758 |
| 14 | Spruce-Fir | SST | Poor | 5,205.70 | 4,216.59 | 1,430.29 | 940 | 4,893 | 3,964 | 1,344 | 1,704 | 8,870 | 7,185 | 2,437 |
| Total Sawtimber | | | | | | | 4,910 | 19,489 | 15,492 | 5,471 | 28,843 | 120,125 | 95,631 | 32,343 |
| 15 | Douglas-fir | PT | Well | | | 1,469.90 | 409 | | | 601 | 2,324 | | | 3,416 |
| 16 | Douglas-fir | PT | Med. | | | 945.56 | 719 | | | 680 | 2,056 | | | 1,944 |
| 17 | Douglas-fir | PT | Poor | | | 666.59 | 800 | | | 53 | 530 | | | 353 |
| | Ponderosa Pine | PT | Well | | | 175.66 | | | | | 90 | | | 16 |
| 18 | Ponderosa Pine | PT | M&P | | | 175.66 | 811 | | | 142 | 5,527 | | | 955 |
| 19 | Lodgepole Pine | PT | Well | | | 1,696.72 | 295 | | | 500 | 1,866 | | | 3,166 |
| 20 | Lodgepole Pine | PT | Med. | | | 1,331.71 | 285 | | | 379 | 4,368 | | | 5,817 |
| -- | Lodgepole Pine | PT | Poor | | | 1,331.71 | 30 | | | 40 | 274 | | | 365 |
| -- | Limber Pine | PT | Well | Use Pike VS-20 | | 694.92 | | | | | 30 | | | 21 |
| -- | Limber Pine | PT | Med. | Use Pike VS-20 | | 694.92 | 60 | | | 42 | 120 | | | 83 |
| -- | Limber Pine | PT | Poor | Use Pike VS-21 | | 375.42 | 10 | | | 4 | 55 | | | 21 |
| -- | White Fir | PT | Well | | | 1,469.90 | | | | | 215 | | | 316 |
| | White Fir | PT | Med. | | | 945.56 | 20 | | | 19 | 130 | | | 123 |
| 21 | Spruce-Fir | PT | W&M | | | 1,055.69 | 215 | | | 227 | 2,821 | | | 2,978 |
| 22 | Spruce-Fir | PT | Poor | | | 283.48 | 30 | | | 8 | 1,110 | | | 315 |
| Total Poletimber | | | | | | | 2,964 | | | 2,695 | 21,426 | | | 19,889 |

(Table Continued)

Table 31 (Continued)

Area and Volume By Volume Stratum and Total Volume For State and Privately Owned Lands

| Volume Stratum No. | Type | SSC | SC | Volume Per Acre: Int. ¼" B.F. | Volume Per Acre: Scrib. Dec. C B.F. | Volume Per Acre: Cubic Feet C.F. | State & County Lands: Area Acres | State & County Lands: Total Volume Int. ¼" M B.F. | State & County Lands: Total Volume Scrib. Dec. C M B.F. | State & County Lands: Total Volume Cubic Feet M C.F. | Privately Owned Lands: Area Acres | Privately Owned Lands: Total Volume Int. ¼" M B.F. | Privately Owned Lands: Total Volume Scrib. Dec. C M B.F. | Privately Owned Lands: Total Volume Cubic Feet M C.F. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | Lodgepole Pine | S-S | All | | | 453.98 | 320 | | | 145 | 1,051 | | | 477 |
| | Spruce-Fir | S-S | All | | | 453.98 | | | | | 90 | | | 41 |
| Total Seedling Saplings | | | | | | | 320 | | | 145 | 1,141 | | | 518 |
| | Douglas-fir | NS | All | | | | 70 | | | | | | | |
| 24 | Spruce-Fir | NS | All | | | 0 | 10 | | | | 440 | | | |
| Total Nonstocked | | | | | | | 80 | | | 0 | 440 | | | 0 |
| Total Coniferous Types | | | | | | | 8,274 | | | 8,311 | 51,850 | | | 52,750 |
| 25 | Aspen | SST | All | 6,658.61 | 5,126.28 | 2,097.56 | 20 | 133 | 102 | 42 | 114 | 759 | 584 | 239 |
| 26 | Aspen | PT | All | | | 1,076.54 | 1,067 | | | 1,149 | 10,103 | | | 10,876 |
| 27 | Aspen | S-S | All | | | 40.83 | 435 | | | 18 | 2,232 | | | 91 |
| | Cottonwood | SST | All | 6,658.61 | 5,126.28 | 2,097.56 | 50 | 333 | 256 | 105 | 350 | 2,330 | 1,794 | 734 |
| Total Hardwoods | | | | | | | 1,572 | 466 | 358 | 1,314 | 12,799 | 3,089 | 2,378 | 11,940 |
| Grand Total | | | | | | | 9,846 | | | 9,625 | 64,649 | | | 64,690 |

Note: Board foot volume is in trees 9.0" d.b.h. and larger. Cubic foot volume is in trees 5.0" d.b.h. and larger.

# Compartment Map of San Isabel Working Circle

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

LYLE F. WATTS, CHIEF
T.W. NORCROSS, CHIEF, DIVISION OF ENGINEERING

# SAN ISABEL NATIONAL FOREST
## COLORADO

NEW MEXICO AND SIXTH PRINCIPAL MERIDIANS

1947

Scale
1 0 1 2 3 4 5 6 7 8 9 Miles

**LEGEND**

- National Forest Boundary
- Adjacent National Forest Boundary
- Main or good Motor Road
- Poor Motor Road
- Trail
- Railroad
- Telephone Line
- Supervisor's Headquarters
- District Ranger Station
- Guard or Ranger Station (Not permanently occupied) — REPORT FIRES HERE
- House, Cabin, or Other Building
- Municipal or Other Airports
- Triangulation Station
- Sawmill

- Compartment Boundary
- Compartments in which cutting will be done in period July 1, 1962 — June 30, 1972
- Roads to be constructed during 10 Year Period

*Compiled 4/11/58 T. C. E.*
*Revised 11/9/59 & 6/20/60*

Compiled at Regional Office, Denver, Colorado, in 1942 From U.S.G.S., Forest Service Aerial Surveys, Bureau of Land Management (Formerly G.L.O.), and other surveys. by R F B Revised Feb. 1947 by F.F. Edited by F.E.W.

CAUTION: The accuracy of this map is unknown since compiled from sources of unknown accuracy.

Longitude west from Greenwich

Polyconic projection
North American Datum